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PREHISTORIC
ROCK ART
IN SCANDINAVIA

AGENCY AND ENVIRONMENTAL CHANGE



COURTNEY NIMURA

This volume is dedicated to Richard Bradley

Swedish Rock Art Series: Volume 4

PREHISTORIC ROCK ART IN SCANDINAVIA:
AGENCY AND ENVIRONMENTAL CHANGE

Courtney Nimura



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Front cover image: A rock art 'scene' on the Vitlyckehällen in Bohuslän

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INTRODUCTION

At the start of the postglacial period, in a Scandinavia that was still largely covered by the great Fennoscandian glacier, a tradition began that would last for thousands of years. This tradition would evolve and grow in manifold ways whilst simultaneously maintaining a core lexicon of recognisable imagery and familiar scenes. This tradition was making rock art.

Archaeologists, both Scandinavian and not, have found themselves captivated by these enigmatic images on stone. These images represent the largest body of visual imagery from Northern European prehistory stretching from northern Germany to the Arctic reaches of northern Norway. The Scandinavian tradition includes Denmark, Norway and Sweden, though similar rock art is also found in Finland, Russia and the eastern Baltic countries. The quantity and chronological extent of this rock art is aptly represented by the wealth of published material on the subject. However the majority of these rock art studies have focused on relatively small geographical areas, not the expansive geographical extent of Northern European rock art. Regional studies have been immensely important in articulating theories regarding their areas of study, but these theories are often inapplicable in other regions. And though general theory may be applied to smaller geographical areas, it is difficult to use smaller-scale studies to generate general theory. This was one of the key motivations for this research. Present-day geopolitical boundaries segment prehistoric Scandinavia and present challenges (different academic traditions, languages and national databases) for multi-national comparison. One of the main aims of this research was to create a database that would allow for a Scandinavian-wide investigation of prehistoric rock art from the Stone Age to the Early Iron Age. What this book contains is a presentation of these data derived from this new database in a series of distribution maps, tables and scattergrams. Though a general theory is proposed, it is intended to supplement existing interpretations of Scandinavian prehistoric rock art.

Certain imagery from the lexicon of rock art symbols was also immortalised in other media. The most prominent of these images was the ship, which is depicted on small portable art objects and appears in the form of large monuments. This icon of travel, trade, fishing and exploration is the most scrutinised motif in Scandinavian prehistoric art studies because of its pervasiveness geographically, temporally and materially. Because the ship is such a widespread symbol through time and space it is the ideal motif upon which to focus this Scandinavian-wide study.

In recent years advances in the study of palaeolandscapes have spurred new investigations into the prehistoric environments in which these rock art sites were

created, and these studies have paved the way for new interpretations. These newer rock art studies challenge the paradigms that previously structured our hypotheses of Scandinavian prehistoric rock art and this has opened the floodgates for a wide variety of proposals regarding the meaning, style, purpose and consumption of this enigmatic material. Reconstructing past landscapes has prompted an exciting insight: that the ship images in prehistory were often located close to water whether coasts, lakes, rivers or other wet landscapes. Smaller-scale studies incorporating palaeolandscape data reveal that ships were often created on rocks in proximity to water: a clear decision on the part of prehistoric rock art makers. Yet many of these sites do not appear close to water today. This is due to a phenomenon resulting from the last Ice Age. The weight of the Fennoscandian glacier that blanketed Scandinavia forced the land to sink below its equilibrium. When the glacier melted, sea levels rose and coastlines encroached causing massive flooding of land in the Mesolithic. After this initial inundation the land began to return to its equilibrium, in an action called glacio-isostatic rebound. So after inundation came the retreating of coastlines as the land rose. This 'shoreline displacement' was most dramatic in the Bronze Age. With new data on prehistoric landscapes coupled with a Scandinavian-wide database we can attempt to answer some basic questions, the first being: where did ship motifs appear in relation to water? The ship is not the only motif in Scandinavian rock art that is repeated across time and space. Other imagery such as footprints and animals, humans and geometrical shapes were also favoured. Do these other motifs show a similar or different relationship to water than the ships?

What this book does not attempt to do is interpret the meaning of all rock art in Scandinavia. This would be a futile effort as the material is nothing if not diverse. Yet enough commonalities are identified within this diverse corpus to propose that rock art expressed prehistoric communities' worldviews and was an integral part of social ritual. Some of these worldviews arguably extended over a large geographical area and existed for a long period of time. These worldviews could not have excluded a community's thoughts and perceptions about its landscapes, as the landscape would have played a starring role in the community's conjectures about the workings of the world. Indeed the placement of rock art in the landscape was a conscious decision that supports this proposition. This leads to the fundamental question that is considered in this book: would changes to the landscape, such as shoreline displacement, have affected the purpose and meaning of rock art for these communities? This book is primarily intended to present a new dataset comprised of the national heritage agencies' databases from Denmark (Fund og Fortidsminder by Kulturstyrelsen), Norway (Askeladden by Riksantikvaren) and Sweden (Fornsök by Riksantikvarieämbetet). However in order to answer the question just posed, a number of theories and methodologies will be used and applied to the core dataset and associated analyses.

CHAPTER SUMMARY

Historically the interpretation of prehistoric art, rock art included, fell under the purview of not just archaeologists, but anthropologists, ethnographers, antiquarians, art historians and museum curators. Though this book will not delve into the details of this interesting past, Chapter 1 presents key approaches to interpretation that each of these disciplines has influenced. Chapter 1 also introduces Scandinavian rock art and looks at the significant body of portable art from the region, some of which has been instrumental in the interpretation of rock art, especially in southern Scandinavia. The portable art upon which this study focuses is namely the bronze razors found in Denmark and southern Sweden. They have been a critical source for dating one of the most abundant images in rock art: the ship.

Because of the prominence of the ship motif, the rock art of Scandinavia has often been interpreted in terms of social ritual, cosmology, and religion associated with the maritime sphere. Therefore Chapter 2 looks at the significance of the ship and its relationship to a maritime landscape. What is generally recognised as a weakness of many theories proposed for the purpose and meaning of rock art is that their origins are localised: they are usually based on a body of rock art from a relatively small geographical area. Is it possible to propose such theories for Scandinavia as a whole?

Chapter 3 presents the methodology for the creation of a Scandinavian-wide database for prehistoric rock art. A number of analyses conducted in the following Chapter 4 are also explained. These analyses focus on motif distribution and geospatial analysis of rock art sites' proximity to watery locales.

Chapter 5 draws on a variety of theories and propositions by anthropologists, cognitive scientists and archaeologists concerned with perceptions of landscape. It focuses on material agency as a means to understanding the role of rock art within society, and uses material agency to support the general theory proposed in this book. This journey through a prehistoric Scandinavian landscape will lead us into a world of ancient beliefs and traditions revolving around this extraordinary art form.

PART I

1. ROCK ART IN PREHISTORIC SCANDINAVIA

Scandinavian prehistoric rock art was created from as early as the middle Mesolithic through to the Early Iron Age. The period upon which this book focuses is the Nordic Bronze Age c. 1700–500 BC, for it is in this period that the majority of rock art was created. This chapter acts as an introduction to Scandinavian prehistoric rock art. It will look at when and where it was created, what images it portrays and compare those to other sources of similar imagery. It will then introduce a few general interpretations, leading on to the specifically maritime theories presented in Chapter 2. In this book motif names will be capitalised to distinguish the images from actual features.

Rock art scholars delineate two main methods of interpretation: informed methods and formal methods. Writing either informed or formal interpretations of Scandinavian rock art requires investigation into more than just the field of archaeology (see Chippindale 2001; Chippindale and Nash 2004, 14; Chippindale and Taçon 1998; Whitley 2005, 79). Informed methods draw primarily from ethnography, on the insights directly or indirectly gleaned from those who made and used the art (Chippindale and Nash 2004, 14). Through the use of these ‘insider stories’ one aims to interpret the images as an insider, which is referred to as an *emic* perspective. Informed methods were first established to fight generalisation rather than perpetuate universal rules of art making practice. Formal methods, on the other hand, use quantitative or locational data to interpret, and this is referred to as an *etic* perspective. Formal methods are an outsider’s tools independent of insider knowledge. In regards to rock art, ‘The information available is then restricted to that which is immanent in the images themselves, or which we can discern from their relations to each other and to the landscape, or by relation to whatever archaeological context is available’ (Chippindale and Nash 2004, 14). In this chapter many of the rock art studies will employ both informed and formal methods of interpretations, and as we delve into the literature it will become apparent that both methods give rise to benefits and hindrances.

Historically the study of rock art has been a topic of interest for many disciplines, not just archaeology: mainly anthropology (of art), sociology, ethnography, art history, museum studies and (the philosophy of) aesthetics. These disciplines are, of course, also influenced by the social and political historical context in which they were written. Each discipline has an intellectual history that has influenced the history of *rock art studies* (what we have chosen to research) and *rock art theory* (the way we have chosen to interpret the material). Though this

rich and complex history will not be fully explored here, many of the theories obviously draw on the discourses of these disciplines, and they will be presented throughout this book.

Dating rock art and issues of chronology

A major issue in the study of rock art, and the first question that most people will ask when confronted with this material is: how do you date it? The most popular methods of dating rock art today are by shoreline displacement and typology, both in isolation and in combination with one another. Shoreline displacement depends heavily on geological studies that include a variety of factors such as postglacial isostatic and eustatic data. Johan Ling's recent studies of the regions of Bohuslän (2014) and Uppland (2012) are examples of the detailed level of shoreline dating currently achievable (see also Sognnes 2003; 2010a; Gjerde 2010a, 59; Goldhahn 2008a, 19; Helskog 1999; 2004; Coles 2004; 2005). In one example from Bohuslän, Ling (2014, 91: fig. 7.26) dissects the 'Runohäll' rock art panel in Tanum by altitudes and measured terrain curves, showing when different sections of the panel could have been carved (Fig. 1.1). Typologies of motif imagery are based largely on the imagery from objects that can be dated by absolute methods (such as ship imagery on bronzes found in sealed grave contexts). Typology studies have a longer history and are still used today for relative dating (Malmer 1981; Kaul 1998; 2004a; b; see Goldhahn 2008a, 17 for a comprehensive list). The ship motif has been a key motif around which typologies have been created, for it appears on objects that can be more precisely dated (Fig. 1.2). Issues regarding dating and creating chronologies for rock art sites are particularly evident at sites whose imagery accumulated over long periods of time. Determining how to chronologically organise activity at sites has been and continues to be deliberated (Østmo 1991; Helskog 1985; Sognnes 2008). Currently more excavations are being undertaken at rock art sites, but these are sporadic. Though the dates of many rock art sites, and the methodology by which this is determined, is still debated, the majority are assigned general date spans that can be used to place them into an archaeological chronology.

Mesolithic art

We begin our tour of Scandinavian rock art in the Stone Age. During the Mesolithic in southern Scandinavia (Denmark and Skåne), art-making practice was dominated by portable art and rock art was not widely produced. In this region, portable art took numerous forms: amber pendants and figurines, ornamented antler axes, hammers and shafts, bone daggers, knives, mattock-heads and points, stone knives, as well as worked flint and painted wood. Mesolithic portable art is almost non-existent in northern Scandinavia as opposed to southern Scandinavia. In Tomasz Plonka's (2003) catalogue, the section on central Scandinavian portable art collates the objects found in Vestland, Østland, Trøndelag in Norway and Jämtland, Dalarna, Bohuslän, Närke, Södermanland, Västergötland, Östergötland in Sweden. North of these centrally located counties, there is little to report. Portable art in this period was indeed a tradition that flourished primarily in the

south.

However, unlike in southern Scandinavia, there was a distinct rock art tradition in northern Scandinavia beginning in the late Mesolithic and arguably even earlier than that. Because of this regional division, rock art from the Mesolithic–Neolithic is often called ‘the Northern tradition’ (c. 9000–2000 BC), or ‘the Hunter’s tradition’. The oldest and best known sites from this period come from northern Norway: the Nordland region, Alta in Finnmark, the Troms County region and Vingen in Bremanger. Northern tradition rock art is characterised by depictions of big game animals such as elk, red deer, reindeer and large sea mammals such as porpoises, seals and whales that were contemporary residents. Regional traditions within the Northern tradition can also be discerned. Sites in Nordland, for example, are polished instead of carved or pecked and were originally situated at the Stone Age shoreline (Lødøen and Mandt 2010, 4). One such polished rock art site in this region is at Fykan Lake in Glomfjord. It was originally situated above a waterfall, and portrays one of only two known fish images from this tradition, along with other animal motifs such as a chimeric-style bear with the head of an elk (Lødøen and Mandt 2010, 74). Sagelva at Hamarøy depicts two lone reindeer situated close to what were once roaring rapids; so close that it is likely the water level reached just below the polished figures (Gjerde 2010a, 213, 236–37; Lødøen and Mandt 2010, 75–6). Their location is also in proximity to reindeer hunting pits, possibly of similar date (though this is highly speculative), and more generally to reindeer crossing grounds that would have been favourable for hunting (Gjerde 2010a, 216). At the World Heritage Site in Alta, Finnmark, the rock art chronology spans from 5000 BC–AD 100 and comprises five main concentrations of rock art around the Alta fjord: Kåfjord (c. 5000–1800 BC), Hjemmeluft, Storsteinen (c. 4200–1800 BC), Amtmannsnes (c. 1800 BC) and Transfareldalen (c. 2000 BC–0, and possibly as old as 3000 BC) (Gjerde 2010a; Helskog 2014, 29; Lødøen and Mandt 2010). Here similar ‘stylistic traits’ are observed on either side of the bay at the same sea level elevation, and it is assumed that these panels were carved close to the shoreline (Helskog 1988; Lødøen and Mandt 2010, 22–3). Vingen in Bremanger dates from c. 5000–4000 BC and is situated on the edge of the Vingepollen arm of the Frøysjøen fjord (Bakka 1979; Lødøen and Mandt 2010; Lødøen 2006; Mandt 1998). It is one of the larger concentrations of rock art containing c. 2100 images on 300 panels and features a variety of animal motifs dominated by deer (over 40%).

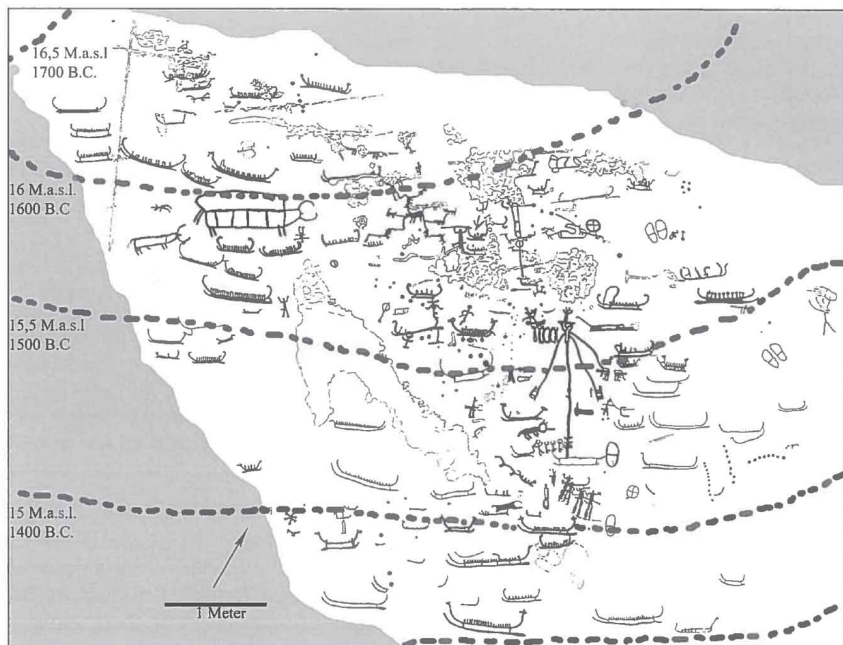


Figure 1.1. 'The 'Runohäll', Tanum 311, with the measured terrain curves (documentation by Gerhard Milstreu & Henning Prøhl 1996), showing the altitude and when, during the Bronze Age, the site rose out of the sea. It would not have been possible to make the rock art during period I; it is more likely that it was made during later phases, 1500–1000 BC' (Ling 2014, 91: fig. 7.26).

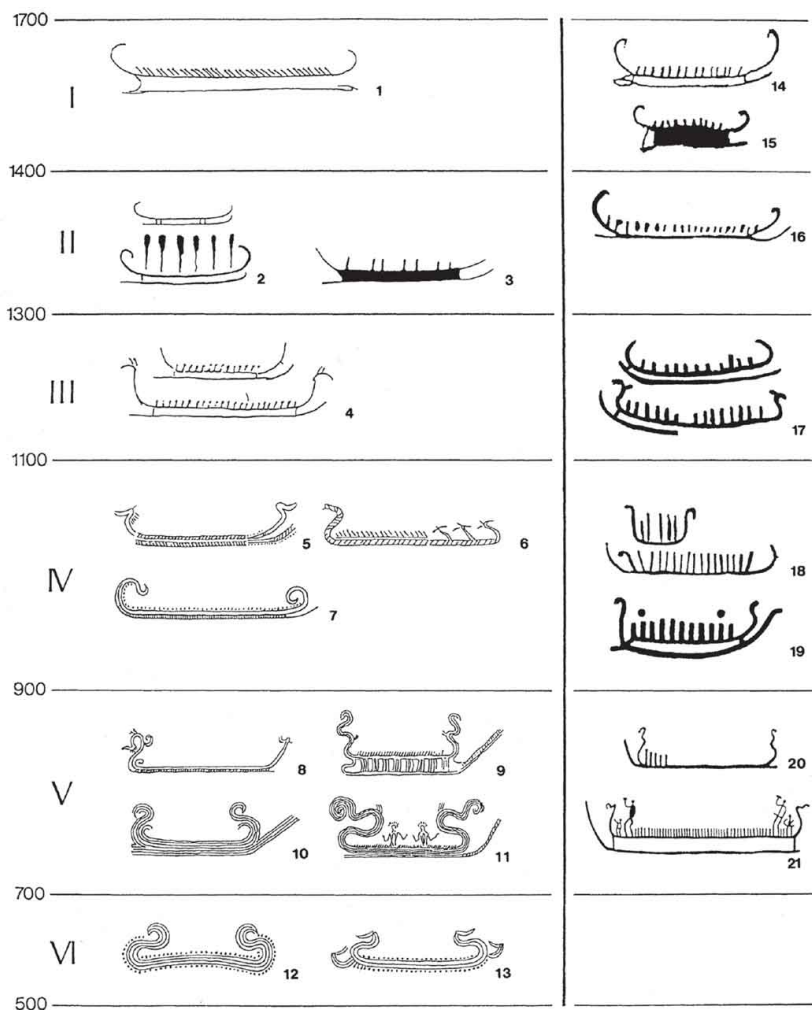


Figure 1.2. 'Diagram showing the chronological-typological development of Nordic-Bronze-Age ship-renderings. Left column, datable ships, right column, ships on the rocks which can be dated by analogy with the ships shown in the left column' (Kaul 1998, 88).

Generally speaking, the Stone Age/Northern tradition rock art sites seem to be located in proximity to watery locations. This has led to rock art interpretations that place importance on the sea. It was the Kålfjord site in Alta that served as exemplary of Helskog's theory of the tripartite 'shoreline connection', a cosmological landscape where sky, water and land meet. And it is at Vingen that Lødøen and others have postulated that the dramatic mountainous and watery landscape could have made Vingen a 'sacred place'. Marek Zvelebil (2008) postulated that sites such as Nämforsen in Sweden were connected to or represent the cosmologies of the region that were closely related to the landscape. These theories will be considered more closely towards the end of this chapter.

Neolithic art

In Denmark, southern Sweden and southwestern Norway, the beginning of the Neolithic is dated to around 4000 BC, though it was adopted at differing rates throughout the south Scandinavian region. These primary Neolithic groups were labelled the Funnel Beaker culture (TRB) in Denmark and southern Sweden (as far north as the Dalälven River). Shortly after, the Pitted Ware culture (GRK) developed in east central Sweden and spread quickly into southern Scandinavia (mainly northern Skåne). After the GRK, southern Scandinavia became home to the Single Grave/Corded Ware culture in Denmark and the Battle-Axe culture in Sweden (north of Skåne) and Norway. The Corded Ware and Pitted Ware cultures existed simultaneously in various parts of southern Sweden and (possibly) southernmost Norway (Hallgren 2009). In northern Scandinavia, the Neolithic in Norway and northern Sweden is much harder to describe, for here the Neolithic package does not contain all its standard defining characteristics. In eastern Norway, Torben Ballin (2004) dates the transition to the early Neolithic c. 5200 BP/4005 BC. Christopher Prescott (1996) goes so far as to question whether the Neolithic (by common definition) even existed in Norway, with more concrete signs of the Neolithic cultural package only seen in the Late Neolithic c. 2400 BC. The Slate Culture, for example, describes groups of early Neolithic hunter-gatherers who made pottery (indicative of Neolithic cultures) but had not yet adopted farming (a missing indicator of Neolithic culture). At about 2800 BC, the Corded Ware/Single Grave culture (as called in Denmark) and the Battle Axe culture (as called in Norway and Sweden) grew to dominate the entire region until the Bronze Age (Jensen 2006a; Larsson 1994). What this brief introduction exemplifies is that this period in Scandinavian prehistory is complex, and the rock art tradition within it is equally so.

As in the Mesolithic, the tradition of rock art in the Neolithic is scarcer in the south compared to the north. Some of the few examples of Neolithic rock art from southern Scandinavia are found in the form of Cup Marks on passage graves from the middle Neolithic. Straddling the line between portable art and rock art is the collection of engraved stone slabs from settlements such as Rävgrav in the Skateholm area (Larsson 1992, 15) or from megalithic tombs (Kaul 1993; 1997). One such engraved stone dates to around 2800 BC and is ornamented with eight concentric circles that are connected by radiating lines (Kaul 1997, 165–66). Kaul (1997, 167) has postulated that the ornamentation on the stone is ‘some sort of a sacred image of the sun used or made for cultic purposes’.

In northern Scandinavia, the largest concentrations of Neolithic rock art can be found at Nämforsen, Norrfors and Laxforsen. Nämforsen in Norland, northern Sweden is dated to c. 5500–3500 BP/4345–1825 BC and is predominantly Neolithic, though contains some panels that are arguably Late Mesolithic (Zvelebil 2008, 46; Bolin 2000; Gjerde 2010a; Goldhahn 2002; Hallström 1960; Malmer 1981; Sognnes 2002; Tilley 1991). Nämforsen is situated in a distinctly watery landscape, which is typical of other Mesolithic and Neolithic sites. It is one of the eight Neolithic rock carving sites (some of which are arguably of earlier date) that Joakim Goldhahn (2002, 33) shows is situated next to loud rapids or what he calls ‘sounding water’. In this period there is also a rise in portable art from northern Scandinavia. Non-plastic ornamented materials have been found at Nämforsen in the form of red slate daggers (4000–1700 BC) (Goldhahn 2002, 54–5; Tilley 1991).

Goldhahn believes that the red colour is particularly interesting not only because the material is rare, but also because the colour connects them to the tradition of using red ochre in burials. The red slate material is sourced from outcrops along the Ångerman River but has a wider geographical distribution, suggesting an expansive gift exchange system of red slate objects. Goldhahn wonders if 'the rituals connected with the rock-engravings in Nämforsen played a vital part in this ceremonial gift exchange system and in the production and reproduction of human social relations' (Goldhahn 2002, 55). Wyszomirska's (1984, 61) comparative study of figurines includes 81 figurines found at 21 different Neolithic hunter-gatherer sites in Sweden and six figurines from five different Neolithic hunter-gatherer sites in Norway. The Swedish figurines come in a variety of forms, namely 'anthropomorphic figures, elks, unidentifiable quadrupeds, seals, birds, bears, boars/domestic pigs, wild horses, and unidentifiable ... highly fragmented figures', as do the Norwegian figurines, appearing as 'birds, bears, seals, elks, whales, and human beings' (Wyszomirska 1984, 63). What is striking is the similarity of imagery between rock art and portable art in this period. It seems that the two art forms were intertwined and had a much greater influence on each other than in the preceding period.

Bronze Age art

The environmental distinction between the Mesolithic and Bronze Age periods is unique, for the first is a period of coastal inundation and the second a period of shoreline displacement. Even considering regional differences, these periods were both highly affected by changes to the shoreline, though visually and experientially they were very different types of changes. And as has already been pointed out in the Mesolithic and in the Neolithic, the rock art is often found close to watery locations. This will be repeated again in the Bronze Age.

Literature concerning the Bronze Age is vast and the distinguishing characteristics are more easily identified than in the previous periods. Bronze Age Scandinavia is less geographically divided than in the Mesolithic and Neolithic, though it is most pronounced on the coasts of Norway, the east coasts and southern half of Sweden, and all of southern Scandinavia. Scholars have traditionally included the whole of Scandinavia under the heading the 'Nordic Bronze Age'. The chronology used for the Bronze Age of Scandinavia is based on Oscar Montelius's divisions: the late Neolithic B is named the 'earliest' Bronze Age and thereafter there are six periods, each c. 200 years long that fall into two main periods, the Early Bronze Age (Periods I–III, c. 1700–1100 BC) and Late Bronze Age (Periods IV–VI, 1100–500 BC) (Jensen 2006b).

In the Early–Middle Bronze Age the archaeological record shows an explosion of change in material culture, settlement and subsistence patterns, burial practices and art making practices, which includes the mass production of rock art. Portable bronzes and rock art are abundant across Denmark, Norway and Sweden, but are concentrated in the central to southern regions. This 'Southern tradition' was created from c. 1800 BC to AD 400 (Lødøen and Mandt 2010). The Southern tradition of rock art is famous for its thousands of depictions of Ships and a lexicon of largely figurative motifs. Along with Ship motifs there are Sun symbols, Horses,

Eels or Snakes, Dogs, Humans, Weapons, Wheeled Vehicles, Feet and Foot Soles, to name a few. And these motifs are found in a variety of combinations that comprise sometimes-elaborate scenes. At Alta, in northern Norway, Animals are corralled or hunted by Humans wielding weapons at Kålfjord; on Storsteinen over 600 motifs, mostly Animals, are arranged in a complex scene that eludes interpretation. In the south, most famously in Bohuslän, humans are portrayed engaging in duels, in 'wedding' scenes (see Fig. 1.3), as acrobats or in 'martial arts' activities and these often include Animals, Ships and abstract motifs (see also Figs 3.2, 3.5 and 3.6).

Though there are many crossovers between imagery in portable art and rock art, not all appear in the same media. As Richard Bradley (2009, 125) explains 'It is generally accepted that among the commonest elements shared between bronze artefacts and rock carvings are boats (many of them with their crews), sun symbols and horses. Portable artefacts also depict sea creatures, while human figures, weapons, and other species of animals are found in open-air rock art'. Nor do the images all appear in similar contexts. In Bohuslän, Sweden it is observed that human motifs generally appear on higher ground away from the shorelines, whilst Ship images dominate the shore-bound panels (Bengtsson and Ling 2007). It is generally assumed that Ships often appear in coastal environments, and are lacking in inland environments. However, this has never been shown on a pan-Scandinavian scale, and in some areas, such as Ångermanland and Jämtland in the middle north of Sweden, a large portion of rock art appears near inland water.

In Sweden and Norway, rock art is predominantly carved onto open-air rock outcrops that dot the landscape. In Denmark, where such outcrops are largely absent, rock carvings also appear on portable stone slabs. There are currently 27 hand stones – stone slabs with images of a hand and four dashed lines above the hand – known from Denmark, northern Bohuslän in Sweden and Østfold in Norway (Goldhahn 2009). The hand stones from these areas are similar in appearance and contexts: most of them are found on covering stones used in cremation burials (Goldhahn 2009, 96). The hand stones have been interpreted as relating to birth and death cycles and a 'day- and sun symbolism', again, ideas that will be considered in the latter half of this chapter (Goldhahn 2009, 101; Kaul 2004a). Rock carvings are also found on stone slabs from burial contexts such as in Bredarör on Kivik (Sweden), Hvidegård in Zealand (Denmark), the Sagaholm barrow near Jönköping, Småland (Sweden) and Mjeltehaugen, Giske island in Sunnmøre (western Norway) (Harding 2000, 343; Askvik 1983; Goldhahn 1999; Ling 2005; Mandt 1983; Randsborg 1993).

Portable bronze objects are abundant in the Nordic Bronze Age. Punching techniques created the simpler ornamentation on most bronze objects from the Early Bronze Age, but by Period II and III, lost wax casting techniques enabled more complex and ornate ornamentations (Harding 2000, 225). These objects are increasingly diverse in form, ranging from trumpets, lurs, spectacle fibulae as well as personal adornments and ritual items such as the famous Trundholm Chariot of the Sun (dated c. 1500–1300 cal BC). And though bronze is abundant in the archaeological record in this period, according to recent isotope analyses of bronze objects from Sweden, it appears that bronze was not sourced from the few known native copper ores but were imported from foreign locations (Ling *et al.* 2013). As Bradley (1989, 17) notes, 'Given that Scandinavia lacked its own supply of metals and could obtain them only through long distance exchange, it is not surprising

that the ship [a dominant rock art motif] was such an important symbol'. The Ship motifs that appear in Bronze Age rock art are also depicted on portable bronzes. Flemming Kaul's (1998) typological study of the imagery on portable objects created in the Late Bronze Age has played a significant role in the dating and interpretation of Ships in rock carvings. The study led him to construct a cosmology revolving around the movement of the sun, which he postulates was formulated around 1600 cal BC. Kaul's work on Bronze Age cosmology and religion will also be explored later in this chapter.

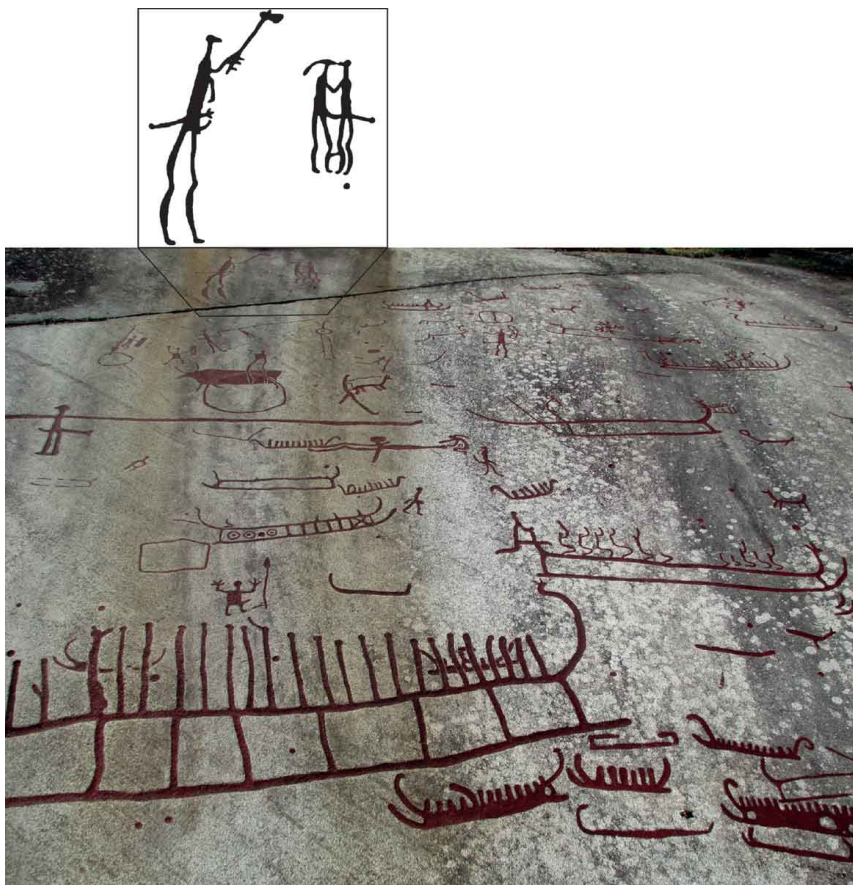


Figure 1.3. A rock art 'scene' on the Vitlyckehöllen in Bohuslän. At the top of the sloping panel are the famous 'lovers' in a wedding scene, next to a human holding an axe. Photo: Courtney Nimura.

Early Iron Age art

In the late 19th century Sophus Müller and Montelius created the first chronologies of the Pre-Roman Iron Age, dividing it into three phases for Denmark and Scandinavia. Today it is commonly two main phases that are given for the Pre-

Roman Iron Age (early and late). By this period in prehistory connections to foreign lands are more common and extend further. To contextualise Scandinavia, Jørgen Jensen (1997) equates the start of the Pre-Roman Iron Age chronology to the Central European Hallstat chronology phase D2 c. 500 BC, though an updated Hallstat chronology argues for the beginning of the Hallstat D from c. 625–450 BC (Henderson 2007, 117–19). Jensen (1997, 205) has suggested that the significant changes occurring in the Central European zone during this period possibly had a causal connection with the end of the southern Scandinavian Bronze Age. Recently Peter Skoglund (2013a; 2015) has stressed that the Scandinavian Late Bronze Age Period V displays many similar characteristics, *e.g.* changes in settlement patterns and the circulation of iron objects, with the beginning of the central and northern European Iron Age (Hallstat C, c. 800 BC). He argues that it is time to reconsider Montelius' Period V/VI as possibly marking the start of the Scandinavian Early Iron Age. Similarly John Coles and Anthony Harding (1979, 491) characterise Bronze Age Period VI as a 'transitional phase' between the Late Bronze Age and the 'full' Iron Age. Lotte Hedeager (1992) gives the following chronology for the Iron Age in northern Europe: Early Pre-Roman Iron Age (Montelius' Period I–II): 500 BC–150 BC; Late Pre-Roman Iron Age (Montelius' Period III): 150 BC–0. More recently Leo Webley's (2008, 15) study of western Denmark uses the following chronology: Early Pre-Roman Iron Age: 530/500 BC–250 BC; Late Pre-Roman Iron Age: 250 BC–50 BC/0; Early Roman Iron Age: 50 BC/0–AD 175/200.

Moving into the Early Iron Age, both continuity from the Bronze Age and diversity in the Early Iron Age can be observed. In the Early Iron Age continuity from the Bronze Age is recognised in ritual practices, votive deposits and burials, whilst a departure from Bronze Age traditions occurs in settlements, houses and artefacts (Hedeager 1992, 240). There is a distinct typological complexity and variety of contexts for metalwork in the Early Pre-Roman Iron Age: 'double-boss brooches, dress pins, belt hooks, iron pins ... and large and small looped rings are found in graves, whilst hoards (mainly from bogs) contain neckrings ... armrings, bronze pins and large and small looped rings' (Hedeager 1992, 67). Metal objects by the Late Pre-Roman Iron Age such as brooches and weaponry found as grave goods are so abundant they actually 'support a free-standing metalwork chronology' (Klindt-Jensen 1953; Becker 1961 as cited by Hedeager 1992, 12).

Continuity from the Bronze Age can also be seen in rock art, whose production in certain regions extended into the Pre-Roman Iron Age. Though some rock art sites were arguably in use from the Late Mesolithic through to the Early Iron Age, the majority are Bronze Age sites that were re-carved and revisited through the Early Iron Age. At the Bardal panel I in Trøndelag, Norway the site was used from the Late Mesolithic into the Pre-Roman Iron Age, though episodically. At this site the Pre-Roman Iron Age imagery consists of boats and horses: some on new panels, some on old panels 'superimposed on some other motifs', and some Pre-Roman Iron Age re-carvings of older panels (Sognnes 2008, 241). Further north in Alta, Knut Helskog (2000, 2014) has recently argued that the chronology of rock art there extends from the Late Mesolithic to AD 100. Nämforsen, though predominantly Neolithic, also appears to have a chronology extending into the Early Iron Age (Baudou 1977, 72 as cited by Bolin 2000). In southern Scandinavia, Skoglund (2013a) contends that the rock art from Järrestad, Skåne spans an extensive period from 1700 BC–200 BC. Torp in Skredsvik, Bohuslän contains

images created continually from the Late Neolithic, Bronze Age and Pre-Roman Iron Age (Bengtsson and Ling 2007; Bertilsson and Bertilsson 2006). Lasse Bengtsson and Ling (2007) propose that reusing existing rock art sites, as opposed to creating new sites, may have been a way of revitalizing existing sites and reconnecting with these 'symbolic places in the landscape' as the society was changing to a more 'fixed and organized agrarian tenure system' (Bengtsson and Ling 2007, 49).

Ships across different media

From the Mesolithic through to the Early Iron Age the Ship featured prominently in Scandinavian rock art. But Ship representations also appeared in different media during the Metal Ages: on portable bronzes, swords, and in the form of stone monuments in the shape of ships (ship settings). There are geographical and chronological convergences and divergences amongst the media, which are evident in the distribution maps (Fig. 1.4–1.7). The Ships found on bronze objects (predominantly razors) in Denmark and Sweden date mainly to the Late Bronze Age (Kaul 1998). Unfortunately the bronze razors in Sweden are less well documented, and the published distribution map for the southern Swedish razors with Ship imagery is incomplete, though still included (Fig. 1.4; Dotzler 1984). Ship settings are largely dated to the Late Bronze Age/Early Iron Age (Fig. 1.5–1.6). The settings occur mainly on the island of Gotland with lower density occurrences on the Norwegian and Swedish mainland. Let us look more closely at these two features.

Bronze razors

There has been ample research conducted on the c. 800 Ship motifs depicted on 420 bronze objects found in southern Scandinavia. The key publication for this research is Kaul's *Ships on Bronzes*, though many have analysed this material (Kaul 1998; see also Ballard *et al.* 2003; Bradley 2006; 2008; 2009: chapters 6–8; Dotzler 1984; Kristiansen and Larsson 2005; Skoglund 2009). The distribution of these bronze objects and rock art Ship motifs across central to southern Scandinavia shows a distinct pattern that was first pointed out by P.V. Glob (1969). The bronzes (namely razors) with Ship motifs are concentrated primarily in Denmark and Skåne (Fig. 1.4). The objects are mainly razors, the other portable bronze artefacts bearing ship motifs being neck-rings with oval endplates, knives, miniature swords, tweezers and swords. The razors, which are predominantly Late Bronze Age, are almost always found in graves, whilst the neck-rings are found exclusively in hoards. Kaul (1998, 118) points out that the denser concentrations of bronze objects with ship motifs could be explained by a variety of factors: population density, possible spiritual centres, locations with access to / control of bronze supplies and subsequent wealth. It is also possible that they are merely areas where more extensive excavation and collection has occurred. Rock art sites containing Ship motifs are scarcer in Denmark, where the majority of bronze objects with Ship motifs are found (not counting Bornholm, which is an island more closely associated geographically with Sweden). Is it possible that the lack of

rock art Ships in this region is evidence of a decision to ornament bronze razors instead? Or is it merely the scarcity of suitable rock outcrops that forced this change of medium? In the next section theories of Bronze Age religion that have been derived from these Ships on bronze razors are further contemplated.

Ship settings

In the last decade ship settings have become a popular research topic, both in isolation and in connection with rock art and bronze razors (Artelius 1996; Bradley, Skoglund and Wehlin 2010; Nordenborg Myhre 1998; Skoglund 2008; Wehlin 2010; 2012). The distribution of ship settings across Scandinavia, as well as details in areas of denser concentration, show that they are thinly spread across southern Scandinavia: stretching west to Hordaland/Rogaland in southwest Norway and south into northern Germany, with the majority concentrated on the island of Gotland and the eastern coast of Sweden (Fig. 1.5–1.6). They are a far less frequent and less dispersed phenomenon than Ships in rock art or on bronzes (Fig. 1.7). Ship settings originated in the Early Bronze Age Period III or IV, around the time when burial practices changed from inhumation to cremation burials (Skoglund 2008; Wehlin 2010, 92). The tradition of erecting these (often gigantic) monuments went in and out of fashion in various regions at different times before the tradition ceased completely in the Iron Age (c. AD 1000) (Skoglund 2008, 390; Andrén 2014). How does one explain the changes and continuities of the ship setting tradition? Skoglund (2008) postulates that the long time span in which these monuments was created largely explains the changes and continuities between the geographically and chronologically different groups of settings. Though a lengthy time span is one explanation of diversity, there are perhaps more complex social processes at work, as the incoming tradition of making ship settings was adopted and rejected by different regional groups (Wehlin 2010). What are the implications of the Ship symbol appearing as monumental architecture? One of the ways in which scholars have investigated ship settings and their symbolic meaning is by comparing them with Ship representations in other media.

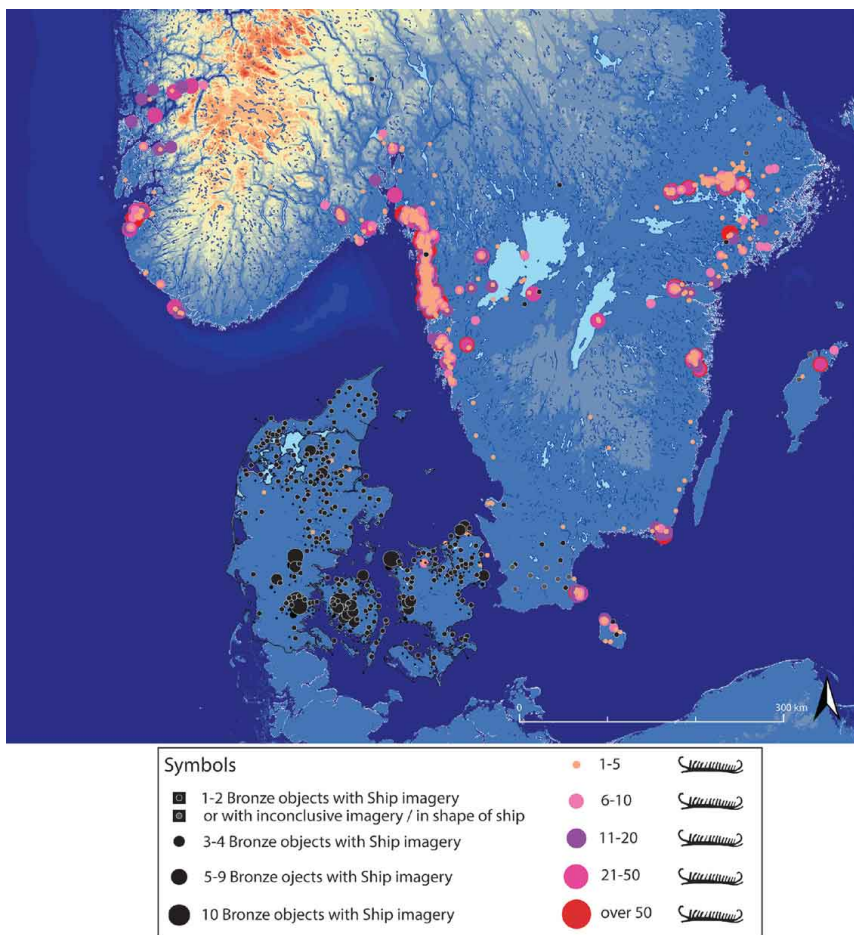


Figure 1.4. Distribution of Ship motifs in rock art; bronze objects (predominantly razors) ornamented with Ship motifs; razors ornamented with inconclusive imagery that could be a Ship motif; or razors in the shape of a ship (based on Ballard et al. 2003, 387; Dotzler 1984, 145–46; Kaul 1998, 118; 2005, 119).

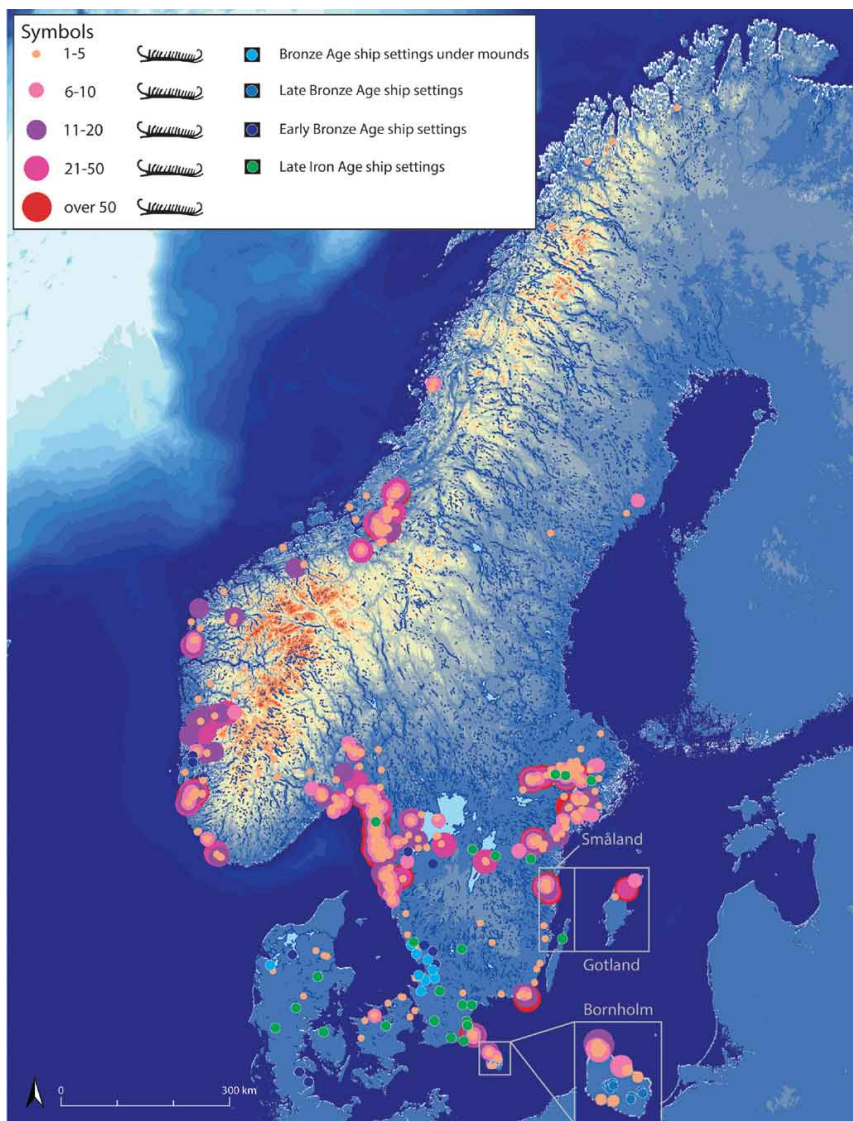


Figure 1.5. Distribution of ship settings in Scandinavia with inset of Bornholm (based on Artelius 1994, 25; Bradley, Skoglund and Wehlin 2010, 80; Kaul 2005, 119; Nordenborg Myhre 1998, 152; Skoglund 2008, 393, 396; Widholm 1998, 133). The detail of Gotland and Småland is shown in Figure 1.6.

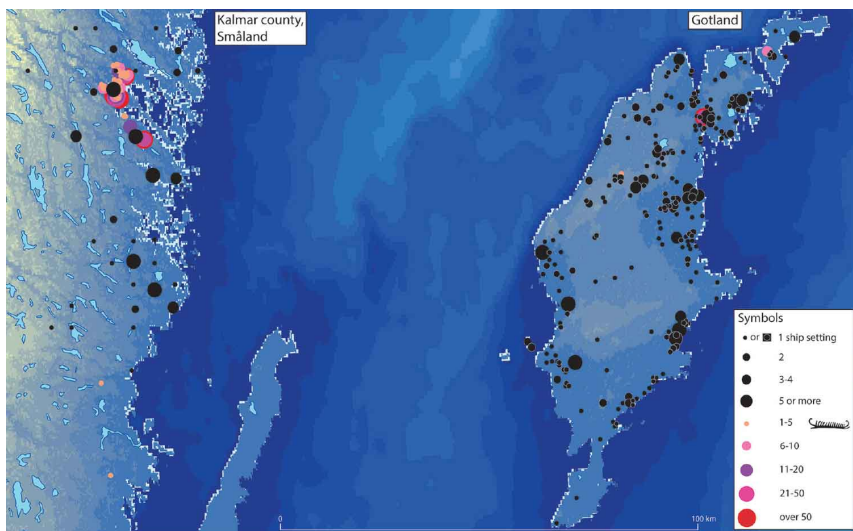


Figure 1.6. Detail of the distribution of ship settings on Gotland (based on Bradley, Skoglund and Wehlin 2010, 80) and Småland (based on Widholm 1998, 133).

Bradley, Skoglund and Joakim Wehlin (2010) recently investigated the relationship of ship settings, rock art and Ships on bronze objects in southern Scandinavia, with specific attention to the ship settings on the island of Gotland, which boasts over 300 ship settings dated mainly to the Late Bronze Age and Early Iron Age. Smaller concentrations of ship settings appear on Bornholm in Denmark, and in Småland on the central east coast of Sweden. Individual settings appear as far as west central Norway and Schleswig-Holstein. Two characteristics of the Gotlandic ships are of note. The first is that the ship settings are primarily bound to the coast. The second is that the Ship motif is barely represented in rock art on Gotland. In fact ship settings and bronze objects with Ship imagery rarely appear in strong association with one another in southern Scandinavia (Bradley, Skoglund and Wehlin 2010, 81; see also Fig. 1.7). Despite ship settings and rock art Ship motifs' weak spatial connection they have notable similarities. Firstly, they often represent the ship's crew, whether by single lines on razors or rock art, or by the individual standing stones in the ship settings. And their prows and sterns usually indicate the direction in which they are facing, represented by raised stems in metalwork and rock art, or different size standing stones in the settings. Secondly, the rock art and bronze object Ship motifs are always shown in profile (from what is discernible). There are also differences amongst the Ship representations: the metalwork imagery revolves around 'the relationship between the sea and the sky, whilst rock art also refers to activities on land' (Bradley, Skoglund and Wehlin 2010, 89). These characteristics of the Ship in three different media have led those authors toward differing theories for the purpose of ship settings. Perhaps they are meant to be emblematic of the passage of the sun and the coastline, evidenced by their specific alignments with the movement of the sun around the island. Or perhaps their spatial association with burials connotes the symbolic passage/transportation of the dead. These theories will be more closely scrutinised in the

following section.

Key interpretations: trends and themes

Throughout this introduction to Scandinavian prehistoric rock art certain trends have been highlighted. It is clear that the Ship was an important icon, which was employed in a variety of media. A connection between rock art and watery landscapes has also been suggested. Because of the Ship's geographical and chronological extent, its connection to water and its multiple forms, it has been the focus of many of the key theories written about the meaning and purpose of rock art. Historically speaking scholars have taken either a practical or a symbolic view of the Ship, but often dichotomously (Ballard *et al.* 2003). In the maritime societies of prehistoric Scandinavia, ships would have played an integral role in activities such as long-distance trade and short-distance travel and fishing. But this practical importance must have also led to a symbolic importance. The ship's integral role in Scandinavian prehistoric societies has led to theories of religion, mythology, cosmology, ritual and shamanism. Many scholars propose that it is possible to see expressions of these belief systems in rock art (see Wrigglesworth 2010 for a concise history of these theoretical trends in rock art interpretation). Let us look at some of these key interpretations now.

Cosmology and religion

Religious, mythological and cosmological systems theorised for later prehistoric Scandinavia, as has already been mentioned, often involve elements of the environment and landscapes that prehistoric peoples inhabited; a relationship that will be reiterated throughout this book. It has become an axiomatic viewpoint that interpreting rock art and portable art imagery within the landscapes in which we find them can give insight into Bronze Age perceptions of those landscapes (Bradley 2006). This subsequently demonstrates how integral elements of the landscape were in the cosmologies of Bronze Age peoples. But rock art was not simply a canvas upon which to document these belief systems, rather one can argue that 'Cosmology was not a free-floating phenomenon, reflected ... in a passive way, but an active act, grounded and embodied in people's everyday lives and their ritualized dealings with their life-worlds' (Goldhahn 2013, 263). These worldviews were integrated into the act of making rock art and creating sites for ritual use and performance, rather than being simple representations of cosmologies. The many and various religious and cosmological Bronze Age systems will be discussed in terms of two main concepts: the movement of the sun and the connection to the dead.

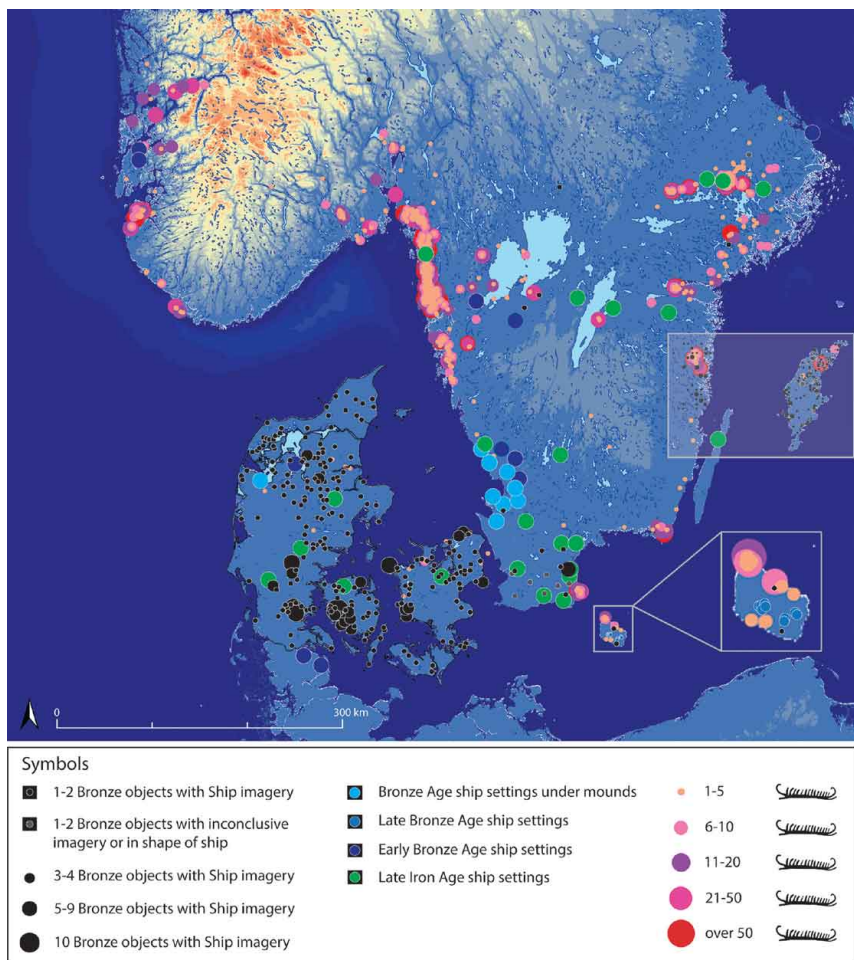


Figure 1.7. Distribution of Ship imagery on bronzes, Ship motifs in rock art and ship settings (based on Artelius 1994, 25; Bradley, Skoglund and Wehlin 2010, 80; Kaul 1998, 118; 2005, 119; Nordenborg Myhre 1998, 152; Skoglund 2008, 393, 396; Widholm 1998, 133). NB: The ship settings on Gotland/Småland are represented by a separate key. The Småland ship settings are dated to the Bronze Age, the ship settings on Gotland are dated to the Late Bronze Age/Early Iron Age (see Fig. 1.5–1.6).

The movement of the sun

It is clear when evaluating relevant research since the publication of Kaul's (1998) *Ships on Bronzes*, that his book has widely influenced Scandinavian prehistoric art research. In this book he presents the cosmological system he formulated, inspired by his study of rock art and portable art. Though his study area is Scandinavia, his 'catalogue of finds' comprises objects mainly from Denmark where the majority of Ship images on bronzes are found. These are the 800 Ship images on 420 different objects that were previously introduced (Kaul 1998, 257). Kaul proposes a tripartite cosmological system, which he argues emerged around 1600 cal BC. It

draws on many of his predecessors' ideas, such as Peter Gelling's (1969) theory that Late Bronze Age worldviews were most likely altered by incoming central Europeans (see also Almgren 1927). Gelling proposed that this allowed for a Late Bronze Age worldview that integrated both indigenous and imported beliefs. Kaul's cosmological system is more empirically supported by the extensive bronze data that he compiled. He categorizes the bronze razors by the direction that the Ship motifs are pointed. The outcome is that the imagery displays a 24-hour cycle, where the different motifs enact their roles in the movement of the sun. The sun is drawn across the sky (from left to right) by a horse in the daytime, and at night the sun is pulled underwater (from right to left), drawn by a fish/snake/eel and the (bird-) ship (see Kaul 1998, 262: fig. 170). This 'cyclical' cosmology as he refers to it, is similar to what has historically been referred to as a 'sun-cult' (Gelling and Davidson 1969). This system, however, does not directly apply to rock art Ships, for he argues that rock art imagery represents the rituals conducted in the Bronze Age, not the mythology behind them.

Though rock art may not directly correspond to Kaul's (1998) schema, the postulation of a sun-cult in the Late Bronze Age could inform the interpretations of the carvings and other ship-related archaeological phenomena. One can, for example, use this theory to re-evaluate ship settings. The Gotlandic ship settings do not conform to a strict directional pattern as the Ships on metalwork (see Wehlin 2012). However, Bradley, Skoglund and Wehlin (2010) propose that the settings running along the coast are perhaps following the daily journey of the sun as it moves *around* the island. Of the seven ship settings in Wehlin's (2012, 67) study that have a recognisable stem and stern, six seem to be pointed south where the sun on the island reaches its highest point. And then there is the association with other circular features. On Gotland around 20% of the ship settings are associated with circular stone settings, which perhaps relates them to the sun (Wehlin 2012). These circular settings could be comparable to the Circles in rock art (repeatedly interpreted as sun images) that are often paired with Ships. This connection between ship settings and the sun is echoed by the connection between Ships and Circles in rock art (Chapter 4; see Hauptmann-Wahlgren 2002, 93). In fact the strength of sun mythology is so robust that it is even postulated to extend past the Iron Age, feeding tenets of Old Norse cosmology. Anders Andrén (2014) proposes that sun mythologies are continuous and can be traced from the Bronze Age through to the 6th and 7th centuries AD.

Ships for the dead

The Ship's connection to the dead has already begun to be exposed by looking at the theories revolving around the passage of the sun. Ships often appear on rock carvings close to the shoreline – an important transitional space for the dead in other proposed prehistoric cosmologies. Ships appear on bronze razors, which are primarily associated with burials. And they are created in monumental form: stone ship settings are often associated with burial urns. The connection between rock art and the dead can also be quite literal, as more than 350 finds of rock art are currently known from burials (Goldhahn 2012, 224). Other times the rock art motifs lead the viewer to the dead, or perhaps even represent the dead themselves. In Bohuslän, Bradley (1997) notes that around 77% of the feet carvings 'walk' up and down the rock art panels in the direction of burial sites.

The connection between rock art, the dead and water is the core link for Helskog (1999), who analyses rock carvings in northern Norway. Helskog's proposition for a tripartite cosmology connected to the shoreline is supported by concepts originating from ethnographic examples. Zvelebil and Peter Jordan (1999, 107) explain that the Eastern Khanty in western Siberia subscribe to a cosmology that consists of a three-tier world: an 'upper (sky) world, the middle (earth) world and the underworld (underground)'. Elsewhere Jordan (2011, 30) has explained that

[A] distinctive 'northern cosmology' exhibits remarkable continuity around the entire circumpolar zone ... [It] includes ... conceptual models of the world that enable 'shamanic' soul-flight to other levels of existence, including a lower under world of the dead and an upper world of spirits.

Helskog (1999, 7) draws on ethnographic examples such as this to aid his explanation for why so many of the northern carvings are situated in the zone where water, sky and land meet. Perhaps the shore represents a kind of border between the three worlds and may be a place to communicate amongst them. This communication could be between the living and the dead, or with other humans who might encounter the carvings. The circumpolar ethnographic record also provides examples of connections between the sea, boats and the treatment of the dead in ritual practices such as burying the dead on islands only reachable by boat, or sending the dead off in boats with no paddles to drift into the sea (see Zvelebil and Jordan 1999). Moving south, there are Early Bronze Age ship settings contained *within* mounds and cairns such as in Knaghaug and Kongshaugen in Karmsundet, southwestern Norway (Nordenborg Myhre 1998, 97). Lise Nordenborg Myhre notes that the placement of these ship settings is in a 'marked' location between sea and land, denoting this place as one of 'transition between two spheres' (1998, 159, *my translation*). Bradley (2009, 142) observes that 'although ships are among the commonest motifs [in rock art], only rarely were they provided with any means of locomotion' and instead they seem 'curiously passive'. This visual passivity combined with the northern ethnographic record further supports the association of rock art panels, ship motifs and settings to burial cairns and the realm of the dead.

The significance of the shoreline can also be attributed to the *passage* of the dead, as exemplified by Kaul's evaluation of bronze razors found in graves. Or considering ship settings on Gotland and the opposing Swedish mainland, there is a clear affiliation of ship settings to cremations and burials, though the cremations and burials take different forms and follow different conventions. On Gotland 'house urns' occur *within* ship settings, whereas on the mainland rectangular cairns are paired with ship settings (Bradley, Skoglund and Wehlin 2010, 97: fig. 6). Bradley, Skoglund and Wehlin (2010) propose that house urns' occurrence within ship settings may be further evidence of a generally accepted view that the dead travelled on ships when leaving the land of the living. The Gotlandic ship settings that occur in pairs show another interesting pattern, where one ship setting will contain cremation remains, whilst the other will not (Wehlin 2013, 203). The standing stones that constitute many Gotlandic ship settings can be representative of crew, in the same way as the 'crew stroke' lines in the rock art Ships (see Fig. 3.5; Bradley, Skoglund and Wehlin 2010, 84–5). However, some ship settings do not contain these standing stone 'crew'. Is it plausible that the presence or absence

of crew and cremation remains is representative of 'two distinct conceptions of the dead, or two stages in the rites of passage: the first when specific people were commemorated, and the second when they had been transformed into an undifferentiated body of ancestors' (Bradley, Skoglund and Wehlin 2010, 94; Skoglund 2010)?

On the opposing mainland in Småland province, ship settings show a strong connection to the landscape and other types of burial monuments (Widholm 1998, 154–55; Fig. 1.6). Dag Widholm argues that pan-Scandinavian cosmologies are expressed in a variety of forms. One of these forms is the handling of the dead through ship settings and other types of stone settings, rock carvings and bronze razors. This postulation that the ship settings are representative of the voyage of the soul after death to another spiritual world is exemplified by such burials as the Hjortekrog cairn, which also contains rock carvings. In Eastern Småland, a comparison of different cemeteries found that a high proportion of the settings 'face eastwards towards the sunrise and are located near water' suggesting that 'the daily movement of the sun' is connected 'with the destinies of the dead, and that may be one reason why the ship was present in so many media' (Bradley and Widholm 2007, 46–7). The movement of the sun and the connection to the dead are both therefore, drawing on similar worldviews.

Shamanism

In 2001(a) Neil Price edited an important volume, *The Archaeology of Shamanism*. It was surely in response to the growing number of scholars who were, from around the mid 1980s, beginning to examine ethnographies of shamanism and apply them to prehistoric archaeology. Rock art and portable art scholars are still, according to Price, the largest group of subscribers to this method. Originally the term 'Shaman' was recorded when encountered in a native Siberian tribe in the 1650s. Today,

...in the broadest and most popular understanding 'shamanism' has latterly come to cover virtually any kind of belief in 'spirits' and the existence of other worlds, states of being or planes of consciousness... (the) 'shaman' has similarly been used to refer to almost any kind of mediator, in any kind of medium, between one perception of the world and another (Price 2001b [1989], 6).

The use of 'shamanism' in prehistoric archaeology theories is today still heavily debated (see Whitley and Keyser 2003 for a review of the shamanism debate), yet it continues to be used in the interpretation of Scandinavian prehistoric rock art. Anti Lahelma is convincing in his application of shamanistic concepts to the rock paintings of Finland. Lahelma combines interpretive methodologies from landscape archaeology, from Saami ethnography, from the epic poems of the Kalevala (a compilation of Karelian folklore compiled in the 19th century) and from Shamanism theory (Lahelma 2005a). He also draws on theories such as Helskog's (1999) 'shore connection' where the shoreline is the meeting location of the three worlds in the sky, on land and underwater. Though Finnish rock art is more often painted than carved, it bears stylistic similarities to Scandinavian rock art both in imagery and content. It also appears in proximity to water. The Finnish material lies outside the study area of this book, but is worth including here. Lahelma examines a number of rock art motifs from the Finnish corpus and, referencing

shamanistic practices, argues that certain motifs could represent trances or altered states of consciousness, the state of mind that shamans can access. He also looks to the landscape, noting that the paintings often occur on tall lime outcrops. This he compares to the Saami ethnographic example of the *seidl*. The Saami *seidl* cult worships rock formations, and believe them to have supernatural power. The lime formations could also be symbolic of a 'vertical axis': a route in which a shaman could move between the upper (sky), middle (earth/rock) and lower (water) worlds akin to the cosmology that Helskog (1999) proposes (Lahelma 2005a, 40–1). This tripartite 'cosmic order' can be compared to a general shamanistic cosmology, or more specifically to 'the conception of a 'world mountain' ... common among Finno-Ugric and Altaic peoples' (Lahelma 2005a, 41; Holmberg 1927). Lahelma (2005b) has also interpreted the boat representations in Finnish rock paintings. In many cases the boats are associated with elk, and some are even amalgamated so that the boat forms the antlers of the elk. These, he states, 'make it clear that the images of boats do not always refer to crafts used for travelling in this world' (Lahelma 2005b, 1). Here again he draws on Saami ethnography, for boats are sometimes depicted on shaman drums as 'vehicles for the soul of the shaman' (Lahelma 2005b, 2). Lahelma argues that there may not have been such distinct categories that divide elk from boat, if both were believed to be shamanistic vehicles and animate beings.

Goldhahn (2002) also makes the connection between landscape, rock art and shamans. He focuses on those rock art sites from northern Sweden that are situated in extreme environments, namely in close proximity to roaring rapids and rivers. By measuring the decibel levels at Laxforsen, he argues that in certain seasons the sound from the rapids is so ear piercing even audible communication is impossible. As ethnographic examples demonstrate, shamans often create situations of physical constraint or duress to reach altered states of consciousness. Here Goldhahn proposes that the extreme levels of noise created by the rapids could have enabled an altered state of consciousness in a shaman, which is represented in the rock images.

Trade, connections and social organisation

Discussions of power, status, and Bronze Age trade and travel often begin with Kristian Kristiansen and Thomas B. Larsson's (2005) *The Rise of Bronze Age Society* (see also Clark 2009; Harrison 2004; Kristiansen 1987; 1989). But Kristiansen elsewhere (2004a) has written about sea faring and its significance for the meaning and purpose of rock art, using the famous burial mound Kivik as a key example. He creates an ontological chain, which assumes that the rock carvings of ships in Scandinavia are based on real ships, that these ships travelled great distances in the Bronze Age, and that we can see where they travelled based on different artistic representations in the rock art ship motifs. Kristiansen proposes that Ships were carved into rock when a chief would depart on a voyage, arrive at his destination and/or return home: rock art sites were places to conduct rituals that would ensure safe and fruitful voyages. These rock art sites could also be symbols of the voyage taken when the dead journey to the 'other' realm (Kristiansen 2004a, 113). Because the ship motif in rock art had manifold purposes and is so prevalent, he argues that it may be possible to map the voyages

themselves by tracing stylistic origins (Kristiansen 2004a, 112). He attempts to do this by comparing images from the Kivik slabs to multiple rock art sites throughout southern Scandinavia, asserting that it is entirely possible to do just this along the Swedish and Norwegian coasts and even over the Kattegat and the Baltic Sea (Kristiansen 2004a, 119).

Kaul (1998) also proposes that rituals associated with Bronze Age cosmologies were performed at rock art sites. Indeed rock art sites, especially the larger open-air sites, are often proposed to have been meeting places of some kind; a proposal that often leads to discussions of power, trade and social organisation (Randsborg 1993; Tilley 1991). These meeting places are often seen as sites where social power and control were performed. Helskog (2004, 282) believes 'the carvings represent liminal places where spirits and people met to maintain and reinforce relationships (Helskog 1999), to maintain social order, to reinforce and negotiate ties, and to distribute rights to resources, for example between coast and inland populations (Hood 1988)'. Bengtsson (2004) similarly suggests that the carvings in Askum parish, Bohuslän are clustered because they were 'stages' for ritual activity that would have been enacted by a social elite (Ling and Cornell 2010, 34–8). The interpretation of scenes as representing actions was a key thesis in Ling's extensive analysis of the rock art of Bohuslän, where he argues that the events depicted, such as 'competitive feasting, meetings and initiations' could have been enacted in accordance with events such as 'rites de passage, journeys, transference of power, launching boats, or death' (Ling 2014, 241). Per Nilsson (2010) on the other hand proposes a more functional purpose: people gathered around the rock carving-rich area of Himmelstalund in southeast Sweden as it proved to be an abundant fishing ground. Jan Magne Gjerde (2010a, 409–10) also discusses the possibility that regions of high concentrations of rock art sites were 'nodes', and that individual sites could have served as meeting places. In northern Fennoscandia, many of the larger sites are located in environments that would have allowed different groups, who shared similar traditions, to come together to perform traditional activities such as hunting and feasting (Gjerde 2010a, 409–10; Hagen 1976, 127–30).

The ship settings in the Bronze and early Iron Ages (1300–700 BC) can also be used as evidence of trade and travel, as well as social organisation. It has been argued that there were different types of boats/ships in use in Bronze Age Scandinavia: those that were smaller and used to travel in calmer waters, and those bigger warships that were used for travelling long distances. These differences may be represented in ship settings by their size and the number of 'crew' (standing stones) that comprise them (Bradley 2008). Skoglund investigates real and metaphorical / symbolic ships and stone-ship burials, and argues that the social hierarchies played out on ships could have also been meaningful on land. For Skoglund (2008, 400), the 'ship is a special symbol because real ships used for warfare and long-distance travelling call for an unequal social organization'. Different regions employed different strategies when it came to erecting and using ship settings, and these various strategies could arguably be evidence of societies performing on land the social inequalities that existed at sea. Many of the theories presented in this section were inspired by ethnographic examples, but these examples are not always drawn from the Arctic Circle. In an interesting mix of ethnography and archaeological evidence, Chris Ballard *et al.* (2003) look to Southeast Asian societies and propose that it is highly plausible that both the

practical and symbolic were at work when the ship was depicted in Scandinavia. They argue that ‘we have to look beyond the simple observation that ships and shipping played a major role in an island society’ and instead focus on outlining the ‘clear hierarchies that operate on board ships as the model for cosmological and social order that many communities have adopted on land’ (Ballard *et al.* 2003, 391 and Manguin 1986, 201).

In this chapter we have undertaken a swift tour not only of Scandinavian prehistoric rock art, but portable art and other associated archaeological features. We have looked at some of the key theories for the meaning and purpose of rock art, which have (not so gently) nudged us towards the sea. There can be no doubt that the Ship played an important role in these societies and that rock art was a canvas upon which to reiterate this importance. The theories for the meaning and purpose of rock art presented in the latter half of this chapter help to draw a clearer picture of Bronze Age worldviews that seemed to revolve around a maritime environment. Let us look into this further in the next chapter.

2. ROCK ART IN A MARITIME LANDSCAPE

Chapter 1 established that the ship in its many forms must have been a vital element of prehistoric society, having been carved on rock, etched on bronze and erected as monumental burials. Chapter 1 also established a relationship between Ship representations and watery landscapes, which may reflect specific and discernible aspects of Bronze Age worldviews. It is clear that the ship is essential to any discussion of Bronze Age worldviews in Scandinavia. Rock art and portable art would have doubtlessly played a powerful role in the propagation of these worldviews (see Bradley 2009: ch. 6). Though it is not a goal of this book to interpret the meaning of all rock art, this book is concerned with how this cultural material might have been affected by environmental change, which requires establishing a few premises. The first is that rock art was integral to the propagation of Bronze Age worldviews. The second is that these worldviews heavily involved the environment. The third is that this environment was often of a watery nature. In this chapter we will look at each of these premises.

Relocating the sea

Chapter 1 presented examples of how scholars have used rock art and portable art as evidence of Bronze Age worldviews, often described as cosmologies, and how these worldviews often involved elements of the environment, whether the sun or the sea. The 'landscape', an oft used yet irregularly defined word, has always factored into rock art studies due to the immovable nature of the rock surfaces upon which rock art is created. But in the past, landscape studies were often 'a traditionally stale account of what can be seen' (Nash and Chippindale 2002, 1). The landscape has also factored into portable art studies to some extent. Though many portable art finds are 'loose', some votive deposits in watery environments and others associated with burials can be contextualised in their intentionally chosen landscapes. In the 1980s and '90s landscape archaeology became more clearly defined as its own interdisciplinary subset of archaeology (e.g. Ingold 1986; 2000; Bradley 2000) and since then it has become commonplace for interpretations to consider the environment in which rock art occurs.

We have already suggested that rock art sites were often created in proximity to watery locations. In the 19th century rock art research was dominated by maritime related interpretations. Many of the earliest discovered carvings contained images of Ships and subsequently antiquarians associated them with maritime societies, originally assuming that they were of Viking age. Rock carvings in Bohuslän were initially seen in a 'maritime' light due to the nature of the imagery, not because of

rock art's proximity to water. However, these maritime centred interpretations from the early days of antiquarian literature were soon discarded for more terrestrial interpretations. These interpretations dominated for many decades, forming the basis of a *terrestrial model* that did not take into account the environmental changes, namely shoreline displacement, which occurred in the period in which most rock art was created. We can start with Oscar Almgren (1927), who argued that the rock carvings in the Bohuslän region were not situated close to a Bronze Age shoreline but should be interpreted in a terrestrial / agricultural environment. Gutorm Gjessing subscribed to both theories. In northern Scandinavia, he noted that rock art was often found close to water, and used this spatial relationship 'as an interpretive element' to connect the carvings to hunting magic (Gjerde 2010a, 39; Ling 2008, 28). In southern Scandinavia, Gjessing agreed with Almgren's 'agrarian' interpretation. Ling (2014) suggests that this historical period was the beginning of the 'terrestrial paradigm', which would create assumptions lasting through the 20th century, especially in rock art rich regions of the south (Nordbladh 1980). One of the first scholars to propose a cosmology for rock art in Bohuslän, one of the site study areas in this book, was Jarl Nordbladh (1980). His cosmological model incorporated the landscape and other archaeological features in the region, and proposed that the rock art was used as a sort of barrier between the presumed settlement areas on lower ground and the cairns found on the higher hills and outcrops (Nordbladh 1980, 44; Bradley 1997).

The birth of the terrestrial paradigm was also the beginning of the division of rock art into northern hunter-gatherer art (Stone Age) and southern agrarian art (Metal Ages). For within the terrestrial model certain assumptions about the motifs were made. Motifs such as wheeled vehicles, ploughs, and terrestrial mammals like bulls are often depicted in southern rock art, and so it was assumed that they were created within a terrestrial environment. There remains a tension today between maritime and terrestrial interpretations, as some still argue that rock art is not coastally bound in areas where there was known environmental change. In a recent catalogue of the rock art of Østfold, Norway, David Vogt (2012, 40–5) argued that the Østfold carvings, in close proximity to Bohuslän, by the Late Bronze Age were created on the clay plains that provided good grazing land.

Bronze Age environmental change

If an integral part of our methodology for interpreting rock art is consideration of the environment (the surroundings in which a living thing exists) and landscape (the visible features of an area), we must be able to describe them. And if a main aim of this book is to determine whether rock art was affected by environmental changes, we must first examine what changes occurred. This examination will focus on the main period in question, the Bronze Age.

The environmental change that characterizes the Bronze Age is shoreline displacement caused by postglacial land uplift (isostasy). The Fennoscandian glacier was approximately 3 km thick during its glacial maximum and spanned c. 2000 by 1400 km (Steffen and Wu 2011). Its centre was near the Gulf of Bothnia, and this location marks the epicentre of the isostatic rebound (Steffen and Wu 2011, 251). A measured 300 m of glacial uplift has occurred in the last 9000 years,

though Mörner (1991) has argued for as much as 800 m of glacial uplift. The uplift was elliptical in shape with isolines radiating out from the centre of the glacier. These isolines are comparable to the geological palaeoshoreline records (Sharma 1984, 251–52). Broader models for isostatic uplift can also be used on smaller scales, for example the land surrounding Stockholm has experienced isostatic uplift at a rate of approximately 4.9 mm/year for the last 3500 years (Mörner 1973; 1980). By subtracting the uplift from the relative sea level factor some claim that you can isolate regional eustatic components (Mörner 1999, 76–7). But there are also other natural activities at work in Scandinavia. Some see the isostasy from glacial weight ceasing c. 2–3000 years ago (around the Late Bronze Age/Pre-Roman Iron Age transition), making the historical uplift a result of tectonic activity (Sharma 1984, 252; see Mörner 1980; 1991). This and other natural activities also affect how we calculate changes to relative sea level (Steffen and Wu 2011).

The most comprehensive archaeological investigations of these phenomena in regards to rock art are two studies by Ling (2014 [2008]; 2012). In his earlier study Ling (2014, 107) focuses on the environmental changes surrounding the World Heritage area at Tanum, Bohuslän where c. 70% of the rock art sites were located near ‘shallow bays, estuaries and inlets’ in the Bronze Age. At the beginning of the Bronze Age, shorelines were approximately 16–17 metres above sea level (m.a.s.l.) and fell to 10–11 m.a.s.l. by the end of the Bronze Age (Ling 2014, 111). Another factor in these calculations is the level of agricultural activity that has taken place in the area since the medieval period, causing about 1–1.5 m of accumulated sediment. These data imply that in prehistory the actual altitude of the terrain would have been around a metre lower than present day (Ling 2014). Ling (2012) continued work on shoreline displacement modelling in Uppland, east central Sweden. This region also experienced drastic environmental changes due to its proximity to the centre of the Fennoscandian glacier. In this study, he uses data from recent shoreline displacement studies that claim sea levels were 23–24 m.a.s.l. in the Early Bronze Age (c. 1500 BC) and 17 m.a.s.l. in the Late Bronze Age (c. 700–500 BC), which can be translated to a shoreline altitude of 25 m.a.s.l. in 1700 BC and 15 m.a.s.l. in 700 BC (Ling 2012, 19). These data are quite similar to the results from Bohuslän. Ling’s studies both in Bohuslän and in Uppland will be used in the case studies in Chapter 4.

Concurrent with shoreline displacement, other environmental changes took the form of climatic shifts. Around 1300–1200 BC the Subboreal Optimum warm period ended and sparked the beginning of a cooler and wetter phase, the Subatlantic Pessimum, which lasted until around 300 BC (Hass 1996, 122). In Skåne, there is evidence of a major climate shift towards more maritime conditions in the Late Bronze Age c. 1000 BC (Berglund 1991). From c. 2800–2500 cal years BP/945–660 BC, temperatures cooled and humidity increased across Northern Europe (Wanner *et al.* 2008, 1801). We know that these climatic shifts affected not only flora and fauna, but also seasonal weather events at various stages in the Bronze Age.

Bronze Age environmental perceptions

In the Bronze Age a key type of environmental change that occurred was shoreline

displacement, but can we assume that this was visually recognisable to Bronze Age inhabitants? Would they have perceived and comprehended these changes? In the Mesolithic many areas of Scandinavia would have experienced flooding due to the eustatic changes following the melting of the Fennoscandian glacier. These sometimes-extreme environmental changes have required scholars to address the effects they might have had on Mesolithic inhabitants. In some regions a coastal dweller would (no doubt) have noticed when the rising sea inundated the place where they were born (Karsten 2004, 74), yet in other regions the change would have been less visible. Still, as Hein B. Bjerck (2008, 67) attests, it is likely that inhabitants who experienced inundation would have been in contact with nearby communities who did not. These known variances would have impacted Mesolithic peoples' worldviews, and the same could be said of Bronze Age coastal changes. In certain areas of Scandinavia, the rates of shoreline displacement were so minimal that the horizontal effect (actually seeing the shoreline retreat) would have been too slow to visualise. In other areas inhabitants would surely have noticed the disappearing coastline. In order to question whether such changes to the landscape had an effect on the production of rock art, we must assume that the inhabitants perceived shoreline displacement in those areas where we know it occurred. In areas such as Bohuslän and Uppland, we can base this assumption on archaeological evidence, for rock art on some panels actually follows the retreating shorelines. This not only implies inhabitants would have perceived changes, but they would also have responded to them. Archaeologists have also looked to other disciplines to support the proposition that these changes were perceived, to attempt to answer how these changes might have been interpreted and the possible effects they may have had on both individuals and social groups. Cognitive studies, psychology, neuroscience and anthropology have all had a hand in this discussion in recent decades. These ideas will be explored further in Chapter 5.

Rock art in a maritime landscape: key theories

The previous section promoted the importance of the environment and landscape to rock art interpretations. Now let us look more closely at how theories from landscape archaeology have been applied to Scandinavian rock art, for as Kalle Sognnes (1996, 26) states, 'Detailed studies of the rock art itself, its sitings and cultural contexts must be conducted before one can choose relevant interpretations. Systematic studies of the relationship between rock art and landscape at different levels seem to be one way of achieving this goal'. The application of landscape archaeology to rock art can be a very functional and practical exercise. We can compare prehistoric art images to subsistence economies of the surrounding area, or look at the distribution of certain motifs in correlation with geological, topographic and natural phenomena. Or it could be a predominantly theoretical exercise. We can focus on the intentionality of rock art landscapes and propose that sites were chosen specifically to create special places in the environment. In short, we can use environmental contexts to inform the rock art (Bradley 2000; 2001; 2006; 2009; Chippindale and Nash 2004; Gjerde 2010a; b; Helskog 2001; Lahelma 2005a; Nash 2002; Nash and Chippindale 2002).

The methodologies for applying landscape archaeology theories to rock art are inherently tied to the question of environmental perception: *prehistoric humans perceived their environments and chose rock art locations based on these perceptions*. Individual motifs could also be representative of how an environment is perceived. This all sounds very self-evident, yet evaluations of environmental perception, place and landscape have only recently been seriously considered in rock art discourses (see Goldhahn 2010 for a concise history of the use of landscape theory in rock art).

Landscapes as sacred places

Landscape archaeologists often make a point of distinguishing a 'place', which holds specialness and meaning, from a 'space', which implies a landscape devoid of human intention. This act of turning a space into a place is arguably necessary in *constructing* landscapes (Nash and Chippindale 2002, 6). In these recent landscape-focused archaeological studies some employ a more functional methodology, for example looking at the distribution of sites in relation to geological features. Others choose to consider how these specific environments could have influenced the *experience* of the site. It is lucky then that most rock art is fixed in the landscape. It is this 'immoveable' quality that for some invites 'an archaeology of human perception, of world-view and of religion ... Its best strength may be in it being simply *art on rock* – an image made on an unmovable surface which is set in a certain place ... rock-art is fixed in landscape. These are pictures in place' (Chippindale and Nash 2004, 1). In Scandinavia, however, where the shoreline has receded hundreds of metres in some regions, it is crucial to include palaeoenvironmental reconstructions to understand what form the landscape would have taken during the period in which rock art was created.

In Scandinavia specifically, the concept of turning a 'space' into a 'place' has become a widely used tool for interpretation. Goldhahn (2010) emphasises the importance of the process of 'placing' rock art in his analysis of the rock art site Nämforsen. The concept of emplacement is a way of explaining how rock art sites were chosen to impose 'a reordering and re-creation of the sacralised world' (Goldhahn 2010, 110). This act is much more meaningful than merely creating rock art on any available surface in the landscape; it is making permanent alterations to a natural environment (see Bradley 2000). Goldhahn also draws from ethnographic examples, this time from the Maoris of New Zealand and their traditional system of gift exchange, in order to analyse the rock art site at Nämforsen and southern Scandinavian metalworking traditions. He postulates that rock art may have been a means 'to communicate and exchange gifts with the sacred forces themselves'; that 'emplacing' rock art in a space imbued it with a mediating purpose that could have been part of a system of exchange between different realms (Goldhahn 2010, 115).

The process of emplacement – putting rock art in intentionally chosen places in the landscape – is an act that can lead to the creation of a sacred place. Daniel Arsenault (2004, 77) argues that in order for a place to be made sacred, religious values must be expressed in the material and visual symbols created in those places. Or perhaps the opposite phenomenon is true. Perhaps it was certain features in the landscape that made a place sacred, inviting users to create rock

carvings or deposit votive offerings in those places (Lødøen 2001; Mandt 2001; Olsrud 2001). The emplacement of rock art has the potential to forge a bond between landscapes and communities, as rock art sites signified the importance of certain places to different social groups. And as we have seen, these places are often associated with cosmological or religious beliefs (Helskog 2004). In fact, Helskog postulates that the carvings actually 'represent religious beliefs and rituals' that prehistoric peoples used to communicate with 'the supernatural' (Helskog 2004, 265). He acknowledges that prehistoric peoples did not have a nature/culture divide as post-Enlightenment western thinkers have delineated, and so their landscapes were 'spiritual/ritual/cosmic'. It is quite possible that these spiritual/ritual/cosmic landscapes are portrayed in the rock art imagery, allowing the viewer to see how rock art makers perceived their landscapes (Helskog 2004, 270). Sognnes (2009) considers the Solsem cave as one such possible spiritual landscape as its natural features alone suggest sacredness. The rock paintings are situated at the far back of the cave, in a difficult to reach location for both humans and natural light. The anthropomorphic images in this stark setting have often been interpreted as associated with shamanism. The cultural layer, assumed to be contemporaneous with the paintings, contained possible sacrificial remains that further support this interpretation. Solsem cave extends deep into the earth and Sognnes proposes that this might have represented a liminal space leading to the underworld. These scholars all argue that the landscape was not only a pertinent factor in choosing rock art locations, but that the landscape itself would have been an integral part of the worldviews to which rock art was related.

We have spoken so far only of sacred places. Less research has been conducted on the relationship between the more profane settlement sites and rock carvings; however what we do know has illuminated certain interesting patterns. Archaeological evidence suggests that there was indeed separate treatment of the landscape by rock art creators. Goldhahn and Ling (2013, 282–83) observe that the simpler, namely cup mark, sites are found near areas with more artefacts indicative of settlement. Complex rock art sites, on the other hand, seem to be located at a distance from settlement sites. Pollen analysis from one such complex rock art site at Lingården in southern Sweden provides evidence of a closed, wooded environment, not a cleared agricultural landscape in which Bronze Age settlements were typically situated (Brown *et al.* 2011).

Landscapes embodied

Landscapes might also be analysed at various scales. Integrating multiple levels of analysis from smaller-scale to larger-scale studies is now a more common practice. At a micro-scale we can contemplate individual rock panels. Bradley *et al.* (2002) observe specific details on the rock surfaces upon which Ship motifs are carved at Revheim, southwest Norway. The vertical rock outcrop at Revheim has numerous quartz veins exposed on its surface, which the authors imagine could represent the sea amidst the imagery. They argue that we should consider not only the rock in the landscape, but also the 'landscape in the rock' (Bradley *et al.* 2002, 111). In this sense the landscape might also be embodied in other monuments associated with portable and parietal art. Goldhahn (2008b, 56) uses four case studies at Bredarör on Kivik in Sweden, Skelhøj in Denmark, Sagaholm in Sweden and

Mjeltehaugen in Norway to investigate the relationship of monuments, landscape and rock art. He regards the landscape as embodied in the monuments, for they themselves are constructed from elements of the environment that have been intentionally chosen. At the Sagaholm barrow red slate slabs were chosen for their colour; at Skelhøj turf was sourced from different areas to cover the mound in visually varied sections. Goldhahn also argues that the lives of those who created the monuments were as much the focus of commemoration as the dead contained within them (see also Oestigaard and Goldhahn 2006). Of the four monuments he scrutinizes, each would have required a significant amount of manpower to construct; therefore the monuments themselves are signifiers of this communal enterprise. Inside Bredarör on Kivik the rock carvings depict the living conducting rituals, rather than portraying the dead. For Goldhahn, both the commemoration of the living and the embodiment of the landscape are central to understanding the meaning and purpose of monuments. The embodiment of the landscape can also be seen at certain rock art sites. At 25 sites in northern Sweden we find rock art located near 'sounding water', a term Goldhahn (2002) uses to describe the rapids, rivers and creeks that sometimes create 'ear-shattering' environmental sound. He assesses not only the landscape in which the rock art panels are situated (in his examples they are often extreme environments), but also the landscape within the rock art imagery. He attempts this analysis by considering rock art images that have 'inner drawings'. This term is used to describe humans and animals drawn in outline, with detailed lines inside their 'body outlines' that are believed to be representations of their inner organs (see Fig 2.1 for an example from Skogerveien). He postulates that the inner organs are suggestive of the breath in the animal/human, and that this same 'breath' can be seen, heard, felt and smelled in the 'sounding water' near sites such as Nämforsen. Could it be then that the river itself was seen to be alive? In this analysis he proposes that the sounding water is embodied within the rock art imagery (Goldhahn 2002, 44). This is a proposition that will be revisited by maritime archaeologists in the following section and also by those who champion the agency of water.

Gjerde (2010b) also calls for micro- and macro-analysis to interpret the landscapes contained within rock art, arguing that the sites themselves have meaning embedded in them. He borrows the term 'memoryscape' from ethnography to describe the landscape as an entity comprised of memories of places, and of places' relationships to each other. He argues that the way in which we know the landscape is 'a result of people's experiences through generations ... memoryscape may help us understand rock art sites as just such a fixation of the past related to memory and place' (Gjerde 2010b, 178). During times of environmental change, Gjerde suggests that creating a memoryscape was a way in which a community could accustom itself to an unfamiliar place, and this was manifested in rock art. It is fitting to conclude this section with Gjerde's (2010a) research, which compiled and analysed rock art sites over a large region crossing political borders in northern Fennoscandia (Norway, Sweden, Finland and Russia). By re-documenting sites (and the number he has included is extensive) he undertakes multi-scalar investigations that evaluate how the landscape is embodied in and relates to rock art. Gjerde's many case studies are scrutinised in terms of macrolandscapes and microlandscapes. When discussing macrolandscapes he favours Helskog's concept of the 'shore connection' in a functional manner: all

his sites, save a few northern Swedish paintings, are located in the shore zone. He highlights the effects that being located in the intertidal and sea-spray zones would have had on these sites both visually and experientially. As noted previously, many scholars argue that special topographic features in the landscape made certain places more ‘spiritually’ connected than others, and this could be the case for rock art sites located in the intertidal zone. Gjerde terms these coastal, tidal zone rock art sites ‘liminal places’ as they are sites of visible environmental change, a term that is reminiscent of Helskog (1999) and Christer Westerdahl (1992; 2005; 2010). Perhaps this is why the macrolandscapes are often ‘depicted’ in the microlandscapes of certain rock art panels. Gjerde (2010a, 419) observes that ‘when studying Stone Age rock art, both the motifs, scenes and the interaction with the microlandscape are references to places, areas and macrolandscapes’. He suggests that journeys undertaken through landscapes may be pictured in the narratives of rock art.

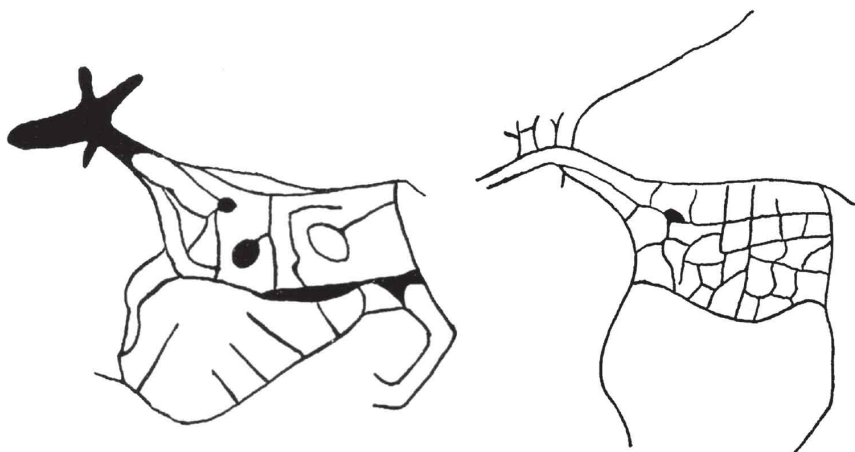


Figure 2.1. Two animals with ‘inner drawings’ from the rock art panel at Skogerveien in Drammen, Norway (after Engelstad 1934).

As we have seen throughout this chapter, landscapes have become a key factor in interpreting rock art sites. We have read through many examples from research on sites around Scandinavia that incorporate landscapes into rock art studies and interpretations, but these ‘landscapes’ were often watery in nature. How does this change landscape-focused interpretation?

Seascapes

In the last few decades maritime archaeology in Scandinavia has influenced the way we currently interpret the archaeology from this region. This next section will introduce a few of these influences and then discuss how theories from this field could be absorbed into prehistoric art studies. To emphasise the maritime nature of Scandinavia, there is a minimum 35,700 km of combined coastline in Denmark, Norway and Sweden. Scandinavian archaeologists have been at the forefront of maritime archaeology since the 1970s, when SCUBA and other underwater

excavation technologies became more readily available and refined (Gregory 2001). This is evident in the vast number of publications in the last few decades from coastal and underwater archaeological projects (see Bailey and Spikins 2008; Bevan and Moore 2003; Coles, Coles and Jørgensen 1999; Fischer 1995; Hvass and Storgaard 1993; Larsson *et al.* 2003; Pedersen, Fischer and Aaby 1997; Vermeersch and van Peer 1990). Iconic sites such as Tybrind Vig and Korsør Nor have changed existing views of prehistory in this region (see Andersen 1984a; b; 1985; 1987a; b; Malm 1995; Pedersen 1995; Skaarup 1993). Evidence for prehistoric peoples' exploitation of the marine environment is described in numerous site reports and has become axiomatic for the Mesolithic period. In a seminal article from 1981, Henrik Tauber showed that seafood was a staple of Danish Mesolithic diets (see Richards, Price and Koch 2003 for a reinvestigation of this material and Craig *et al.* 2011 for lipid evidence from Mesolithic–Neolithic transition culinary practices). Inge Bødker Enghoff (1993; Enghoff, MacKenzie and Nielsen 2007) has further investigated the different species of fish that were consumed at this time, and interprets the vast quantity of fish bones at settlement sites as evidence that they were vital to the economic system in the Mesolithic. This implies a close connection of inhabitants to coastal locations (Andersen 1995; Enghoff, MacKenzie and Nielsen 2007; Fischer 2004; Craig *et al.* 2011). Settlements from the Mesolithic through to the Bronze Age generally are found close to water sources, though they are often set apart from rock art sites. These societies related to the maritime environment in this economic sense, but these maritime settings would have had many impacts on other aspects of their lives, for we can imagine that 'People in traditional societies in coastal areas, on islands, as elsewhere, would not have separated ritual and habitual actions' (Cooney 2004, 323). Rock art and burial sites both display a distributional link to watery environments, as Larsson (2003/04) and others have shown, and votive deposits of portable art and artefacts are well known from bog sites.

We will see in the next chapter that rock art, especially Ship and Circle motifs, is often located close to watery environments, whether along Scandinavia's extensive coastlines or on the edges of lakes, rivers and bogs. The imagery in rock art often depicts aspects of this maritime environment in the form of boats, fish and water birds. Over 19,000 Ship motifs were created in prehistoric Scandinavia, but some scholars still believe that though rock art studies consider watery environments in their interpretations, they are essentially still land-centric:

All archaeological theories have a deep and inherent bias: they were designed to deal with land-based archaeological remains. Furthermore, existing archaeological theories were evolved by land-based, western societies. These are communities that contain within their culture-history a Judeo-Christian philosophy which defined water as chaotic, uncontrollable and fundamentally negative, a barrier more than a bridge. (Flatman 2003, 151)

In prehistory it is highly plausible that Scandinavian societies did not make such distinctions between land and sea; numerous island ethnographies are cited as examples of societies that do not have these divisions (Cooney 2004). Turning to maritime archaeology to inspire new understandings of the maritime environment of Scandinavia seems a logical next step. One starting place is with Westerdahl (1992), who coined the term 'maritime cultural landscape' during his surveys of the Swedish coast of Norrland (from 1975–1980) to fill this watery lacuna in the

archaeological lexicon. The maritime cultural landscape describes regions where landscape and seascape overlap; it is 'the unity of remnants of maritime culture on land as well as on water', which 'signifies human utilization (economy) of maritime space by boat ... and its related constructions and remains of human activity, underwater as well as terrestrial' (Westerdahl 1992, 5–6). This term embodies temporality. Artefacts, monuments, living traditions and past experiences of the sprawling maritime landscape should all be considered in the characterisation of a region. This amalgamation of features into the maritime cultural landscape draws on the concept of the 'cognitive landscape': 'the mapping and imprinting of the functional aspects of the surroundings in the human mind' or as he succinctly states, it is 'Man in landscape, landscape in man' (Westerdahl 1992, 5). This is the way Westerdahl conceives the environment: landscape, seascape and human inhabit the same space that forms the maritime cultural landscape. Marek Jasinski (1993) reinvestigated and further developed Westerdahl's term, discussing the symbolic or cognitive relationship of human and the sea stating that 'When we speak of Man's relationship to the sea, we must always keep in mind that it concerns much more than a utilization' ... there is also 'a cognitive connection to the sea and to the other sea-related aspects of his surroundings' (Westerdahl 1992, 14). These concepts draw on core debates in other areas of archaeology that we have touched on in the previous section and will continue to discuss in Chapter 5. The 'maritime cultural landscape' has become an important term in both maritime archaeology and in Scandinavian prehistoric art studies.

The term seascape has recently been popularised in archaeological discourses in an attempt to assert the sea as a whole and powerful entity, rather than a counterpart to land. Perceptions of land and sea can be quite different in both maritime and non-maritime societies, therefore 'Seeing and thinking of the sea as seascape – contoured, alive, rich in ecological diversity and in cosmological and religious significance and ambiguity – provides a new perspective on how people in coastal areas actively create their identities, sense of place and histories' (Cooney 2004, 323). The concept of an ever-negotiating seamless seascape/landscape can be aptly applied to Scandinavia. Again we can use ethnographies as informative sources. Ian McNiven (2004) finds the Aboriginal Australian and Torres Strait Islanders' 'spiritscapes' a particularly useful example. Ritual sites amongst these communities consist of stone arrangements that are created in the intertidal zone in what McNiven believes is an attempt to control the elements and animals of the sea. This is a tremendously interesting proposal, for rituals aimed at affecting the outcome of hunting and fishing are usually referred to as sympathetic magic. But what do we call attempts to control weather, tides or for instance, the rising sea? In these communities the seascape is 'defined by cosmologies that frame and constrain perception, engagement and use of seas' (McNiven 2004, 332). The terms seascape and spiritscape refer to the same phenomenon, as ancestors (spirits) give form, energy and meaning to the sea. Geographical or inherent features of watery environments, such as islands or tides, were created by and are the 'visual manifestations' of these mythical ancestors (McNiven 2004, 333). Rituals were performed at the sites of these intertidal stone arrangements to control the spiritual forces that in turn controlled elements of the sea:

This intended control (mostly transient) not only includes managing the resource

productivity of the seas through 'increase' or 'maintenance' rituals (spiritual renewal), but also managing winds, waves, tides, animal movements (hunting magic), etc. Ritual management and control of spiritscapes is central to what I call the ritual orchestration of seascapes (detailed in McNiven and Feldman 2003). These rituals of orchestration usually take place in marine contexts – either near the beach (immediate coastal strip or inter-tidal zone) or across the sea (isolated tidal reefs or on the water surface). Such rituals ... usually take place at specially prepared sites. Thus, formal and informal rituals inscribe land- and seascapes with prescribed and situational liminal zones respectively where people experience the spiritual through bodily/sensual engagement (see Langton 2002). (McNiven 2004, 335–36)

In this example perception of the environment is linked to sites and actions through ritual orchestration. This example is similar to Larsson's (2003/4) theory that cairns and rock carvings might have been specifically located in the landscape to prevent the rising sea. Further south in France, Serge Cassen (2009) proposes a similar theory exemplified by the enormous menhirs in Carnac. He wonders if they were created as a barrier to protect communities from the rapidly rising sea and its dangers. In fact many of the examples presented in these first two chapters propose that rock art sites were meeting places to conduct such rituals, especially in the maritime zone. What this introduction has shown is that the maritime nature of Scandinavia would have been integral to Bronze Age society and worldviews. These were maritime cultures. This is what Melanie Wrigglesworth (2010) argues for the Hardanger area of Hordaland, southwest Norway, where the rock carvings contain numerous Ship images and have a close spatial correlation to burials and the sea. She claims that 'Religion is a framework for making sense of the world and one's position within it' and 'could well have been an important factor in the maintaining of social relations and practices' in Bronze Age Scandinavia (Wrigglesworth 2010, 186–87). The maritime nature of Scandinavia would have factored into any such religious framework.

What these first two chapters have affirmed is that the re-evaluation of maritime environments has already affected rock art interpretation. Ling (2014) reminds that a 'terrestrial paradigm' has existed in the interpretations of rock art in the Bohuslän region because sites were assumed to be associated with pastoral landscapes. Early research was dominated by a maritime mode of thinking that used Viking and Icelandic sagas to explain the rock art in Bohuslän, yet the powerful rock art scholar Almgren, who favoured the agrarian approach, rejected these theories. Almgren's interpretation was further solidified once Gjessing proposed the paradigmatic north–south divide of rock art in Scandinavia: older hunting art in the north, younger agrarian art in the south. But it is doubtless that Bronze Age inhabitants were in fact very sea-focused as trade and travel became so prevalent in this period.

We know that coastlines were dynamic in prehistoric Scandinavia, altered since the melting of the Ice Age glaciers. Shoreline reconstructions have been presented as a means to date coastal rock art (Bradley and Phillips 2004; Sognnes 2003), but may also provide insight into prehistoric perceptions of the environment in Scandinavia. These first two chapters demonstrated that a wide range of theories exist, which seek to explain the purpose and meaning of rock art. They also explored how concepts of landscapes and seascapes have affected these theories. The landscape/seascape theories presented also highlighted a fluid relationship where humans both act on environments, and are influenced by them.

Understanding this fluid human-environment relationship is crucial to understanding the effects that environmental change might have had on the purpose and meaning of rock art. For it is possible to characterise environmental change as a threat to prehistoric communities, or as an integral part of an ever-changing world that humans are negotiating.

Many of the theories that have been presented are based on smaller-scale studies: from single rock art panels to provinces. And though these smaller-scale studies are imperative to understand the meaning of rock art in their respective areas, especially in relationship to something as regionally diverse as environmental change, it is difficult to use them to generate general theory on a pan-Scandinavian level. But rock art was a pan-Scandinavian phenomenon, and the many aspects of continuity, chronologically and geographically, do want for general theory as well. In order to attempt to generate general theory, a pan-Scandinavian database of rock art will be used to analyse quantifiable behaviours of motifs and ask two main questions. The first question is: where do Ship motifs appear in relation to water across Scandinavia as a whole? The Ship is not the only motif in Scandinavian rock art that is repeated across time and space. Other imagery such as Footprints and Circular motifs, Animals and Humans were also favoured. Do these other motifs show a similar or different relationship to water? The second question is: would changes to the landscape, such as shoreline displacement, have affected the purpose and meaning of rock art for these communities? In order to answer the first question a queriable pan-Scandinavian platform is required. The second more theoretical question requires interpreting the data from such a platform by drawing on the theories we have just encountered.

PART II

3. DATA COLLECTION AND METHODOLOGY

Methodology

In order to answer a question such as ‘where does marine imagery appear?’, large-scale analyses of rock art motifs in Scandinavia are needed. Such large-scale analyses require a queriable pan-Scandinavian platform. Chapter 2 emphasised that the environment in Scandinavia from the Mesolithic through to the Late Bronze Age was unstable. At different times and in different regions, the coastlines changed. Regional environmental changes will be considered in the site studies in Chapter 4. In order to question the nature of the relationship between coastal environmental change and marine imagery in rock art, we must first establish where marine imagery appears within the large-scale study, and subsequently compare it to different regions of varying environmental change in smaller-scale studies. It is noted that this type of analysis, linking small-scale regional and large-scale Scandinavian studies, is especially important in regards to the Scandinavian Bronze Age (see Sörman and Wessman 2011). The timeline of production is also important in order to compare chronologies and concentrations of coastal rock art. Chronologies are key when discussing the relationship of environmental change and rock art, as the changes varied in different regions and occurred at different rates throughout the Stone and Metal ages. The critical period of analysis is identified as the Bronze Age, for it is in this period that the greatest quantities of rock carvings were produced and also when environmental change would have been visible in a number of regions across Scandinavia. In this chapter we will briefly outline the method of data collection used to create the database of Scandinavian rock art using a Geographical Information System (ArcGIS 10) and introduce the five smaller-scale study areas. Broadly speaking, the methodology of data collection occurred in three steps. First, the national heritage databases from Denmark, Norway and Sweden were combined into one GIS database. Second, motif data (type and quantity) were input for each site in the new GIS database (using the original database information, where available). Third, the motif data were audited against published sources.

Data structures and integration process

The first step in creating a Scandinavian rock art database (this will be referred to as ScanGIS in this book) was to obtain the heritage agency databases from Denmark (Fund og Fortidsminder by Kulturstyrelsen), Norway (Askeladden by

Riksantikvaren) and Sweden (Fornsök by Riksantikvarieämbetet). These data were obtained in ArcGIS-ready shape files and contained all archaeological features registered at the time of downloading and/or exporting (see references for download and export dates). All three databases were then compiled into one ArcGIS database and upon initial entry totalled over 900,000 features. For ease, the heritage agency databases will be referred to as F/DK (Fund og Fortidsminder in Denmark), A/NO (Askeladden in Norway) and F/SE (Fornsök in Sweden). ScanGIS also includes two published distribution maps of Bronze Age metalwork (primarily razors) with ship imagery that were georeferenced onto the present-day GIS map (see Fig. 1.4). ScanGIS works in conjunction with a database that contains the supporting textual evidence and information regarding individual sites (e.g. the English descriptions that were translated in order to obtain motif data). This database will be referred to as ScanDB in this book. As each nation's database is different, we will point out the provenance of certain data discrepancies amongst them throughout this chapter.

Fund og Fortidsminder (F/DK)

The dataset of relevant rock art sites from Denmark consisted of 241 records of figurative rock carvings and 1096 records for sites that consist of only Cup Marks. In Denmark's database, unfortunately Cup Mark records did not contain quantities so they can only be counted as Present/Absent, and the total number of Cup Marks is therefore significantly lower than in reality.

Askeladden (A/NO)

The dataset from Norway was created by the heritage agency specifically for this project to include all archaeological features in the relevant time span. A/NO also includes records in their online version of the database that lack georeference information and therefore cannot be mapped (Berg 2011 pers. comm.). The dataset created for and used in ScanGIS does not include records lacking georeference information, though they are stored in a separate dataset as part of ScanDB.

Fornsök (F/SE)

F/SE is the most structurally different of the Scandinavian databases. The dataset was created by F/SE specifically for this project and included all archaeological features in the relevant time span. F/SE is the only database that included motif information in a queryable field (a GIS attribute table), though records had to be collated in order to make these fields mappable in ScanGIS.

Dates

After integrating the three countries' data, the next step was to conduct an initial editing of the records to exclude records that fell outside the scope of this project. The first phase of data editing excluded all features pre-Mesolithic and post-Early Iron Age. Because of national differences in date categories, the dates for archaeological time periods are varied and therefore were included in ScanGIS in

their original form (including an English translation). F/DK uses a two-tiered dating system, with a general date (text) and a specific date (text) that is based on a start year and end year (numerals) (Nimura 2013a: tables 4.5–4.6). A/NO uses a two-tiered dating system, with a general date (text) and a start year and end year (numerals). A/NO’s start and end dates are far more general than those used in F/DK (Nimura 2013a: table 4.7), though F/SE uses the most general dating system. More specific dates are only assigned to those sites where extensive analysis has been completed, e.g. by excavation, and absolute dates provided (Nimura 2013a: table 4.8). For this project a general date (archaeological time period) was assigned to promote better integration and easier querying (Table 3.1; see Nimura 2013a: tables 4.4–4.8). The second phase of data editing was conducted to exclude all archaeological features beyond the scope of this project (those archaeological features are stored in a separate dataset that can be used in future). ScanGIS currently contains rock art, which includes rock carvings, rock paintings, portable bronzes that have marine imagery and ship settings (Kaul 1998; Nimura 2013a: tables 4.1–4.3).

Table 3.1. The general dates that encompass the various dating codes of the three countries.

General date
B000B0Age
B000B0Age–Iron Age
B800zB0Age–Pre-Roman Iron Age
A0n1Age0
A0n1A06–Medieval
M000B0BC
M000B0BC–Bronze Age
M000B0BC–Neolithic
M000B0BC–Pre-Roman Iron Age
M000B0BC–Iron Age
B000B0BC
B000B0BC–Bronze Age
B000B0BC
B000B0BC–Mesolithic
B000B0BC–Neolithic
B000B0BC–Viking
B000B0BC–Medieval
B000B0man Iron Age
B000B0man Iron Age–Iron Age
B000B0man Iron Age–Viking
B000B0B00zB0Age/Bronze Age

Motifs

After integrating the original databases and editing for date and archaeological feature, the next step was to input motif information so that motifs could be mapped and queried. For the remainder of this book, the terms *site* and *motif* will be used in various figures, graphs and tables. These terms, though somewhat self-explanatory, are defined as follows. *Site* can be used to describe either a single panel or multiple panels of rock art that are in close proximity to each other. This is because the original database records assigned one record to both multiple

panels or to a single panel. A *motif* is defined as a single recognisable symbol whether a carving or a painting. Therefore *Ship sites* will refer to those sites that contain at least one *Ship motif* on at least one panel.

Again, there are national differences in the data structuring and therefore the process of inputting the motif information varied. For instance, other than in F/SE, motif information was not included in the original databases in a way that allowed them to be effectively queried. The motif categories used to catalogue the rock art images were derived from a number of sources. Firstly, they were chosen based on their appearance in the original databases. In F/SE there is a pre-defined set of 27 motifs and any motif that cannot fit into one category is classified as 'Indefinable figure' or 'Other definable figure'. In F/DK and A/NO, there is a more personal nature to motif data entry as there are no pre-defined categories. Motif information exists only in a 'Description' text field. Data entered into each database could have been entered in a variety of ways: by a single person who was interpreting the data originally presented to the heritage agency, directly translated from report notes (and these reports could have been a hundred years old or completed this year), or input from more recent descriptions based on fieldwork. There is indeed a level of human interpretation in the motif data for each of the countries. It is also important to remember that each country had its own tradition of interpretation, therefore what is called 'Sun motif' in southern Scandinavia may be called 'Ring' or 'Circle with Cup Mark' in another region. It is also the case that motif interpretations have changed over time, largely based on theoretical trends in research. Each of these points presents an issue for motif categorisation in the database. The motif categories had to be inclusive of all three countries' motifs, and this resulted in the combination of certain categories (based on image comparison and published sources) and the inclusion of categories that may not appear in each country (what occurs in F/SE does not necessarily appear in F/DK). The nature of such a large dataset (over 22,000 records) meant that each record could not be checked against a published source or visited in person. On the other hand, this means that discrepancies do not impact the overall patterns as significantly as they would with a smaller dataset. The English words chosen for the motifs are based on a combination of direct translation and the generally accepted motif lexicon from published sources (sources used were those published after Malmer's 1981 study, with the exception of Glob's 1969 publication of Danish rock art). There are also seven motif categories that were pre-defined in F/SE but do not occur in, and were not added to, the F/DK and A/NO datasets in ScanGIS.

Motif quantities

When a motif was listed in a record, but its quantity could not be found either in the original database or in a published source, the quantity was entered as one (present). Particular attention was paid to auditing Ship motifs so their concentrations could be analysed with greater confidence in the five smaller study areas. There is a level of human interpretation in defining motif amounts. Where one person might see two Cup Marks, another might see a single natural depression. Because not all records were able to be audited against published

sources or site visits, the provenance of information was preserved by assigning each record a source code. These will not be discussed in detail here. In short, motif information was sourced from the original database, a published source, personal communication or a different relevant database. In F/DK and A/NO descriptions that often included motif amounts were included in a text field, so many had to be checked against published sources. Archaeologists who work with F/SE regularly have informed me that the motif quantities are sometimes unreliable, and this could also be true for F/DK and F/NO (Cornell and Fahlander 2011 pers. comm.; Langhammer 2011 pers. comm.).



Figure 3.1. A rock outcrop at Hornes Mellom in Østfold, Norway with 22 Ships and 15 Cup Marks. Photo: Courtney Nimura.

Motif categories

Some issues associated with the human element of motif interpretation have already been mentioned, but the question of defining motif categories is itself a theoretical stumbling block. By creating a set of categories we are able to conduct a certain type of analysis, such as ‘where does marine imagery appear?’. Yet the categories themselves often force the interpreter to make a motif ‘fit’ into a tidy group and therefore the existence of categories is somewhat determining (Sapwell 2012 pers. comm.). Pre-defined categories make it difficult to allow for variation, of which there is ample amount. Regional studies have shown that rock carving motifs vary extensively from region to region and even within geographically small areas (see especially recent studies by Larsson and Broström 2011 at Nämforsen, Gjerde 2010a in northern Scandinavia; Sognnes 2001 in Stjørdal, Trøndelag;

Wrigglesworth 2011 in Hordaland). Despite these issues it would be impossible to conduct a large-scale study of motif distribution without accepting some level of general categorisation. The motifs that we are most concerned with in this book are the Ship, Foot Sole/Foot and Circle motifs. In this book, 'Circle motifs' are a combined group of Cup and Ring, Ring, Spiral and Sun Cross/Wheel/Wheel Cross motifs. They are defined as follows:

Ship: this category includes anything described as Ship or Boat (Fig. 3.1–3, 3.5–6).

Foot Sole/Foot: this category includes all feet (with shoes and without) and counts each foot individually (Fig. 3.4).

Circle (Cup and Ring): this category includes a number of stylistically different motifs. It describes a single Ring with a Cup Mark in the centre, multiple Rings with a Cup Mark in the centre, or Cup Marks that are arranged in a Ring shape with a single Cup Mark in the centre (Fig. 3.5–6).

Circle (Ring): this category includes all circular motifs that are not Cup and Ring, Spiral or Sun Cross/Wheel/Wheel Cross (Fig. 3.5–6). This includes single Rings, multiple concentric Rings, and fully carved out circles (*not* Cup Marks, which are deeper and lack a carved circle outline). In F/SE, the Ring is incorporated into the category 'Circle Figure', therefore the Circle records were audited in the text description field in F/SE to extract Rings.

Circle (Spiral): this category includes Spirals and 'Triskeles' (a 3-spiral figure), which is entered as three Spirals (Fig. 3.2). In F/SE, the Spiral is incorporated into the category 'Circle Figure', therefore the Circle records were audited in the text description field in F/SE to extract Spirals.

Circle (Sun Cross/Wheel/Wheel Cross): this category includes all circular motifs that have lines within them (Fig. 3.2, 3.6). The most common is a circular outline with a cross inside, but there are many with multiple 'spoke' lines. In F/SE, the Sun Cross/Wheel/Wheel Cross is incorporated into the category 'Circle Figure', therefore the Circle records were audited in the text description field in F/SE to extract Sun Cross/Wheel/Wheel Cross.



Figure 3.2. The Åbyhällen in Sotenäs, Bohuslän, Sweden is dominated by Ship motifs, but includes a wide variety of motifs including Humans, Animal prints, Bulls, Spirals and Sun Cross/Wheel/Wheel Crosses. Photo: Courtney Nimura.



Figure 3.3. Two Ships and an Axe on the rock art panel Simris 19 in Simrishamn, Sweden. Photo: Courtney Nimura.

Site study areas

In order for large-scale analyses to be used meaningfully they should also be tested against small-scale regional studies to understand discrepancies in the data. It is also important to ask questions relevant to the datasets: regional studies can be used to ask site-specific questions and this is where one can better investigate rock art's relationship to a specific environment. Figure 3.7 portrays the structure outlining the different potential scales of analysis. The five site study areas were chosen to incorporate a wide geographical distribution, for their different levels of shoreline displacement, to include the entire time span of the production of Scandinavian rock art (inclusive of Mesolithic to Early Iron Age) and to compare inland and coastal motif occurrences. They are:

North Trøndelag and South Trøndelag: central Norway

Mesolithic to Early Iron Age

The Northern tradition meets the Southern tradition

Visible shoreline displacement

Vestland and Rogaland: southwest Norway

Mainly Bronze Age

Varying levels of shoreline displacement but generally minimal visible change

Very coastally bound

Østfold and Bohuslän: southeast Norway / western Sweden

Possibly Late Neolithic to Early Iron Age

Visible shoreline displacement

Coastally bound

Uppland: central eastern Sweden

Bronze Age to Pre-Roman Iron Age

Visible shoreline displacement

Coastally bound

Denmark and Skåne (specifically Simris): southeast Sweden

Predominantly Bronze Age
 little to no visible shoreline displacement
 Tradition that incorporates inland and coast

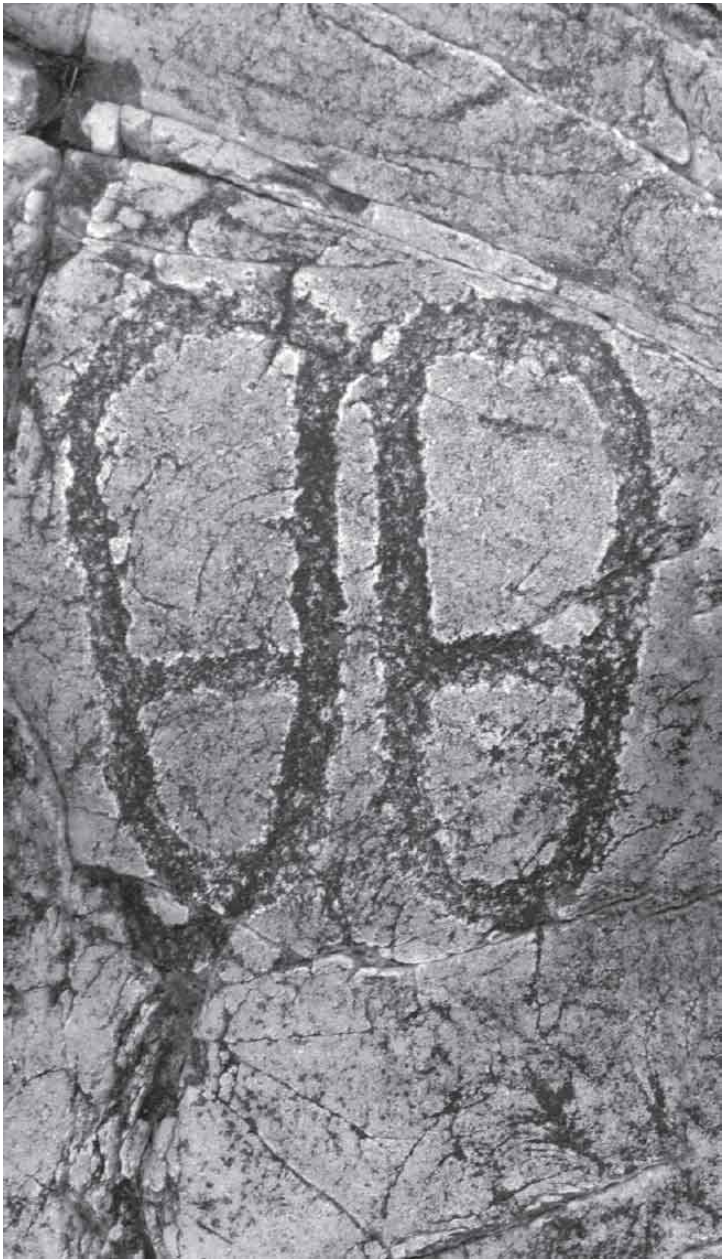


Figure 3.4. Two Foot Sole motifs deeply carved into the panel at Järrestad in Simris, Sweden. Photo: Courtney Nimura.



Figure 3.5. A steep outcrop 'Solberg' with the upper half covered in Ships and Humans with Animals, Cup and Rings and Rings in Østfold, Norway. Photo: Courtney Nimura.



Figure 3.6. Wheeled vehicles, Ships, Humans, Animals, Rings and Cup and Rings amongst other figurative motifs on the Begby panel in Østfold, Norway. Photo: Courtney Nimura.

ScanGIS map data

Several maps of varying resolutions are included as layers in ScanGIS. In addition to a general base map there is a bathymetric map (that includes land elevation data) and a digital elevation model. In order to give a general idea of proximity to water, the 'Near' tool in ArcGIS 10 was used to calculate distances from all mappable sites in ScanGIS to coastlines or bodies of water. This allows the user to query motifs within specified distances of the present-day coastline. We can then

compare the locations of sites to prehistoric sea level heights in metres above sea level or distances to present-day coastlines against environmental information from published sources such as Ling's (2014; 2012). Studies such as Ling's are discussed in greater detail in the site study areas in the following chapter. The maps included in ScanGIS were intended for large-scale analyses. The base map used in ScanGIS is a World Robinson projection map (datum: GCS WGS 1984), which was converted to a SWEREF99 projection for this project. The bathymetric data are derived from the General Bathymetric Chart of the Oceans (GEBCO 2010) *GEBCO_08 Grid*, which have a resolution of 30 arc-seconds. The digital elevation data used are the *Global Multi-resolution Terrain Elevation Data 2010* (GMTED 2011), which have a horizontal resolution of 7.5 arc-seconds (approx. 250 m).

Present-day maps were used because of the disparate nature of available shoreline displacement data in the three countries included in ScanGIS. The only shoreline displacement data available on a countrywide level comes from Sveriges geologiska undersökning (SGU; Geological Survey of Sweden). These data are available in thousand year increments, from 1000 to 16,000 years ago. The online map allows you to produce *general* pictures of prehistoric shorelines that can then be georeferenced into ScanGIS. This means they cannot be used to conduct distance calculations. However, the maps can be used in conjunction with the distribution maps produced in ScanGIS.

Distance to present-day coastline

The 'Near' tool in ArcGIS 10 was used in ScanGIS to give distances to the *present-day* coastlines. When compared to published shoreline displacement data this should give a very general idea of a site's distance to a prehistoric coastline or inland body of water. Many other factors should be considered such as the topography of the coastal region and bathymetric gradations in the coastal zones, as these would have affected the horizontal displacement of the shoreline. ScanGIS is a large-scale database and assumes these data have a margin of error, but they are intended to allow multiple interpretations of sites based on their possible proximity to watery locations by enabling comparison of *relative* distances.

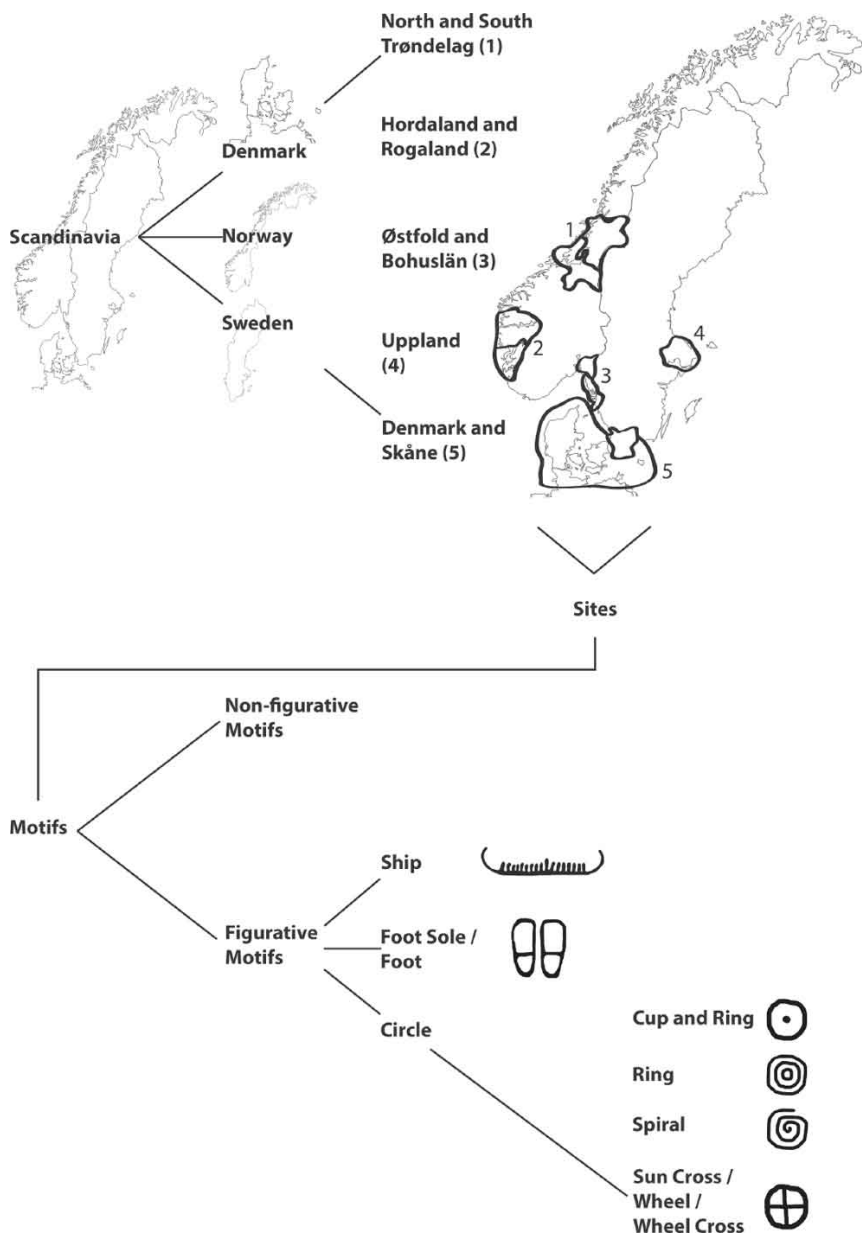


Figure 3.7. Structure outlining the different scales of analysis used in this book. Smaller-scale regions such as provinces and individual sites are not investigated in-depth in this book, though examples of each are used throughout. The site study areas used in this book are outlined above. Different questions can be asked at the various scales: quantities, densities and distributions of motifs can be analysed at all levels, whereas shoreline displacement can be looked at generally at all levels, but should ideally be addressed on a small scale.

Summary

This book is a predominantly macro-scale investigation. Such a large scale provides specific benefits, namely the opportunity to assess broad patterns of motif distributions in rock art across all three Scandinavian countries. This has, up to now, not been realised in a GIS. Despite errors that occur at the site or motif level, some of which have already been outlined, the use of such a large dataset by nature gives a statistical buffer to the broad patterns; small-scale data discrepancies will be less impacting on overall patterns on a Scandinavian-wide scale. As previously noted, these larger-scale patterns can then be compared to smaller-scale regional studies. The key point is that this research aims to employ a multi-scalar approach, using the macro-scale to inspire and possibly answer general questions, and asking more pointed questions of the data at a meso-scale. The micro-scale, from individual site to individual motif, is employed less frequently. On a pan-Scandinavian level we can ask the question: where do images of Ships appear? We can also ask if other motifs such as Circles and Foot Sole/Foot motifs follow the same pattern. On a meso-scale, in the five site study areas, we can look at the evidence for shoreline displacement, and ask where these motifs might have appeared in prehistory. We can also ask our more theoretical question at the meso- to micro-scale: would environmental change such as shoreline displacement have affected the placement, purpose and meaning of rock art? The results of the data analyses conducted in ScanGIS and ScanDB will be presented in the next chapter, where they will begin to draw illuminating patterns of rock art behaviour in Scandinavia and suggest possible answers to these questions.

4. SHIPS AND WATER

The first two chapters of this book explored the reasons for analysing the Ship motif in Scandinavian rock art. Smaller-scale case studies have shown that the Ship is often found close to the coastline. However, this pattern is only made special if we can show that rock art appears inland as well. And as will soon be illuminated, the Scandinavian-wide distribution maps show that it does, though not as frequently. In order to better understand the nature of the relationship between rock art Ships and the coastline, the next chapter will focus on the Ship motif, but also on other motifs that are located in more diverse landscapes, namely the Foot Sole/Foot and Circle motifs. This chapter will examine select results from data analyses conducted using ScanGIS looking first at the pan-Scandinavian picture and then scaling down to the five site study areas. Each section includes *motif distributions* (maps), *motif occurrences* (quantities) and *motifs and water* (distances to the present-day coastline). These are explained in more detail below. Published shoreline displacement data will also be considered in the site study areas.

Throughout this chapter comparisons of motif behaviour are made both between the site study areas and Scandinavia, and amongst the site study areas themselves. Some issues arise when comparing the site study areas, for the chosen regions provide a range of scenarios for environmental change. Because ScanGIS uses present-day coastlines to calculate distances to water, in some cases the distribution maps themselves will give a clearer picture of this relationship. For the topographic maps indicate where water may have reached in prehistory (e.g. low-lying areas). There is also the issue of geographical area. The site study areas are defined by county and province demarcations that are different sizes. North and South Trøndelag comprise nearly 39,000 km², Hordaland and Rogaland around 23,000 km², Østfold and Bohuslän a mere 8000 km², Skåne and Denmark an extensive 54,000 km² and Uppland nearly 13,000 km². We will keep these points in mind as we sift through the data presented below.

Motif distributions

The distribution maps that follow present various combinations of the 27 motifs included in ScanGIS. Many of the maps and motif analyses distinguish *figurative* from *non-figurative* motifs, which is a common typological distinction in Scandinavian rock art studies. The 27 motifs are divided into 20 *figurative* motif categories and seven *non-figurative* motif categories (Tables 4.1–4.2). Of the 27 motifs, it is clear that the Cup Mark dominated rock art imagery, with 257,167 accounted for in Scandinavia (this figure is actually lower than it should be, as the

Cup Marks in Denmark were only counted as Present/one). The second most common motif, however, is the Ship: 19,322 Ship motifs are represented in ScanGIS. The five highest occurring motifs, not counting the Indefinable category, are the Cup Mark, Ship, Human, Animal and Foot Sole/Foot motifs (if the four categories grouped as Circles in this project were combined, they would amount to 3451 ranking them 6th). Because the Cup Mark is so dominant, we can also look at the figurative motif categories separately (Table 4.2).

Table 4.1. From top to bottom in order from greatest to least quantity, the type and total amounts of figurative and non-figurative motifs and the percentage each motif comprises of the total number of motifs in Scandinavia. The grey cells represent the motifs that are originally from the Swedish database 'Fornsök' (referred to as F/SE) and only occur within that dataset.

	Motif	Denmark	Norway	Sweden	Total	% of 311,483
1	Cup Mark	4,444	18,949	233,774	257,167	82.56%
2	Ship	120	3,798	15,404	19,322	6.20%
3	Indefinable	134	1,252	6,975	8,361	2.68%
4	Human	10	539	4,100	4,649	1.49%
5	Animal	6	1,225	3,334	4,565	1.47%
6	Foot Sole/Foot	47	985	2,973	4,005	1.29%
7	Groove-shaped Depression	0	0	2,436	2,436	0.78%
8	Oval	57	119	2,139	2,315	0.74%
9	Ring	83	567	1,364	2,014	0.65%
10	Other Definable	47	491	1,049	1,587	0.51%
11	Grinding Surface	0	0	1,182	1,182	0.38%
12	Grinding Groove	0	0	1,101	1,101	0.35%
13	Sun Cross/Wheel/Wheel Cross	99	164	634	897	0.29%
14	Weapon	0	33	478	511	0.16%
15	Cup and Ring	4	165	243	412	0.13%
16	Frame	0	46	209	255	0.08%
17	Wheeled Vehicle	2	23	135	160	0.05%
18	Spiral	3	75	50	128	0.04%
19	Cross	6	30	51	87	0.03%
20	Track Mark	0	0	76	76	0.02%
21	Tree	0	10	53	63	0.02%
22	Colour Panel	0	0	43	43	0.01%
23	Hand/Arm	18	18	1	37	0.01%
24	Tool	0	6	27	33	0.01%
25	Plough	2	3	27	32	0.01%
26	Net	0	21	9	30	0.01%
27	Ground Oval Depression	0	0	15	15	0.00%

In addition to analysing the Ship motif, Circle motifs and Foot Sole/Foot motifs were also analysed. These two additional motifs were chosen due to their affiliation conceptually with many of the proposed Bronze Age cosmologies. But there is also a distributional affiliation. Circle motifs often exist on sites with Ship motifs (25.69% of Ship sites also contain Circles), and Foot Sole/Foot motifs are also found on sites with Ship motifs (17.66%). In Katherine Hauptmann-Wahlgren's (2002) study of rock art in Östergötland, southeast Sweden, she examines rock art that contains both Circle motifs and Ship motifs in Östra Eneby parish. The results show that 100% of Spirals, 89% of Circle Crosses, 90% of Rings and 100% of Concentric Circles occur with Ships (Hauptman-Wahlgren 2002, 93: fig. 60). These results are impressive when we compare them to Scandinavia as a whole, where only 26% of Circle motifs occur on sites with Ship motifs. However this phenomenon seems to weaken further north (Wehlin 2012, 60). For example in Uppland, only 24% of Ship motifs are related to Circle motifs (Coles 2000),

though this is comparable to the pattern across Scandinavia. It has been noted elsewhere that this distributional shift occurs further north than Trøndelag, where the ‘northern’ and ‘southern’ traditions of rock art mingle (Goldhahn and Ling 2013, 270–1). Further north than Trøndelag the sun traverses the sky differently than in the south. This is perhaps why the cosmologies proposed for the north are associated with the sea and other natural phenomena, rather than the movement of the sun (Bradley and Nimura 2013). Many explanations for the different distributions of rock art motifs are discussed throughout this chapter in regards to the distribution maps that follow.

Table 4.2. From top to bottom in order from greatest to least quantity, the type and total amounts of figurative motifs and the percentage each motif comprises of the total number of figurative motifs in Scandinavia. The grey cell represents the motif that is originally from F/SE and only occurs within that dataset.

	Motif	Denmark	Norway	Sweden	Total	% of 41,178
1	Ship	120	3,798	15,404	19,322	46.92%
2	Human	10	539	4,100	4,649	11.29%
3	Animal	6	1,225	3,334	4,565	11.09%
4	Foot Sole/Foot	47	985	2,973	4,005	9.73%
5	Oval	57	119	2,139	2,315	5.62%
6	Ring	83	567	1,364	2,014	4.89%
7	Other Definable	47	491	1,049	1,587	3.85%
8	Sun Cross/Wheel/Wheel Cross	99	164	634	897	2.18%
9	Weapon	0	33	478	511	1.24%
10	Cup and Ring	4	165	243	412	1.00%
11	Frame	0	46	209	255	0.62%
12	Wheeled Vehicle	2	23	135	160	0.39%
13	Spiral	3	75	50	128	0.31%
14	Cross	6	30	51	87	0.21%
15	Track Mark	0	0	76	76	0.18%
16	Tree	0	10	53	63	0.15%
17	Hand/Arm	18	18	1	37	0.09%
18	Tool	0	6	27	33	0.08%
19	Plough	2	3	27	32	0.08%
20	Net	0	21	9	30	0.07%

Motif occurrences

It is also useful to understand the ways in which motifs are distributed not just geographically, but quantitatively. Do Ships appear in large concentrations on individual panels? Or are they used more sparingly on individual panels? In order to clarify these types of patterns, tables of motif quantities are provided throughout this chapter. For Scandinavia, a series of tables of the main motifs give the total number of rock art sites and the number of rock art sites that contain *x* motif (*x*= Ship, Circle, Foot Sole/Foot motif). The tables then show the percentages that *x* motif sites comprise of the total number of sites in each country, and in Scandinavia. The total number of *x* motif is then given for each country and in Scandinavia. Another series of tables show the concentrations of the three main motifs per site. The tables of motif quantities and concentrations will expose certain patterns. For example if we know that Ships often appear in groups of around one to five per panel, then panels that hold large concentrations of Ships are more rare and may imply that a site is special.

Motifs and water

The general motif distribution maps presented in this chapter also amplify certain patterns. Some of these patterns have been recognised in smaller-scale case studies, but have not yet been exemplified on such a large scale in recent years. Following the pan-Scandinavian distribution maps, regional scale distribution maps in the five smaller-scale site study areas are provided. These maps draw a very general picture of motif distribution, but can a relationship between motifs and water be further explored by more targeted geospatial analyses? In order to attempt this, calculations were made of distances from rock art sites to bodies of water. These distance calculations are another way of investigating the Ship motifs' relationship to water.

Methodology

The distance calculation results are given in 1 km intervals. Within the first kilometre, the distances are subdivided into 0–25 m, 26–50 m, 51–100 m, 101–500 m, 501 m–1 km. Distances further than 25 km are given from 25 km to the furthest distance *in one interval*. Distance tables for Scandinavia are provided, where each interval shows: the number of sites that contain x motif (x = Ship, Circle or Foot Sole/Foot), the total amount of each motif in the site study area, and the percentage that the total number of x motif within each interval comprises of the total number of that motif in each site study area. In Scandinavia, distances were calculated for the following:

Distance to the nearest water's edge. Two different distance calculations were conducted using the *Near* tool in ArcGIS 10. The first distance calculation gives the distance from all sites to the closest body of water: a present-day inland watercourse, inland body of water or coastline.

Distance to the coastline. The second distance calculation gives the distance from all sites to the present-day coastline.

In the five site study areas, calculations of distances to the coastline were conducted for four of the site study areas, as the presence of present-day inland water sources on a smaller-scale might skew the results. Distances to inland water, watercourses and to the coastline were conducted solely for Uppland. This serves two purposes. First, the area of Uppland under scrutiny is bound to the coast of Lake Mälaren, where the majority of rock art is found. Second, by showing both types of calculations we can compare their results. The complete tables of the distance results and the corresponding scattergrams, which produced the R-squared data, are not included in this book, though their results are referred to throughout this chapter (see Nimura 2013a: chs 5–6). Summaries of the distance calculation results are then compared to published case studies of environmental change in the smaller site study areas. Unfortunately the published shoreline data are varied in their level of detail. However they can give a general picture of possible shoreline displacement (or the lack thereof) in these coastal locations. It is important to remember that the inland bodies of water and the coastline used in ScanGIS are from present-day sources. However, what we are interested in with these comparisons are the *relative* distances, which still allow us to ask questions on a broad scale such as: do Ships more often appear closer to water or further inland?

Scandinavia

Motif distributions in Scandinavia

Ship motif

Though Ship motifs are largely concentrated in the south, they are not an entirely southern phenomenon. In fact, recent research supports the proposition that the Ship motif was first created in the north in the Stone Age, and was popularised in the south in the Late Stone Age/Early Bronze Age (Goldhahn and Ling 2013). In some areas the Ship motif appears in combination with motifs from both the 'northern' and 'southern' tradition of rock art. This is most apparent in Trøndelag, where Ships can be dated typologically to both the Late Stone Age and Bronze Ages.

Upon first look, there is an obvious similarity in the distribution and density of Ship motifs and the distribution and density of figurative motifs in general. Upon closer inspection, the only key difference is in the *inland* areas, where sites dense with motifs *do not* contain Ship motifs (Figs 4.1 and 4.2). This phenomenon is perhaps more clearly displayed in Figures 4.3 and 4.4, which display the Ship motif sites and figurative motif sites as a single size point to make the site distribution visually clearer. The lack of Ships in inland areas is further emphasised in Figures 4.5 and 4.6, which show only sites without Ship motifs. Without considering the calculated distances to water, the distribution maps clearly show that there is a greater concentration of Ship motifs in the coastal areas or clustered around large bodies of water such as Lake Mälaren, Lake Vättern and Lake Vänern. The number of sites containing Ship motifs and the concentration of Ship motifs at individual sites, however, varies throughout Scandinavia. This will be discussed in the next section.

Ship motifs compared to non-Ship motifs

The distribution maps that show non-figurative motif sites that do not contain Ship motifs, and figurative motif sites that do not contain Ship motifs, provide a useful introduction to the comparison of Ship, Circle and Foot Sole/Foot motifs, if only because they show the extent of rock art across Scandinavia (Figs 4.5 and 4.6).

Looking at the distributions of Circle motifs, it is clear that the inland sites are dominated by Circle motifs that occur without Ship motifs (blue dots) (Fig. 4.7). The Foot Sole/Foot motifs follow a similar pattern, as the majority of the Foot Sole/Foot-only sites (yellow dots) are located in the inland areas (Fig. 4.8). It is also interesting to note that there is only one site from the database that contains a Foot Sole/Foot motif further north than central Norway and Sweden (around the inland Trøndelag region). The Foot Sole/Foot motif is almost entirely a southern tradition. If we compare all three motifs in one distribution map, it is apparent that those sites that contain Ship, Circle and Foot Sole/Foot motifs (brown dots) do not appear further north than southern Nordland. In fact, they mostly appear within the five site study areas (Figs 4.10 and 4.11). Figure 4.10 also shows that there are rock art sites that appear in the inland mountainous areas as well as by bodies of water or coastlines. The majority of these inland mountainous sites do not contain Ship, Circle, or Foot Sole/Foot motifs (black dots).

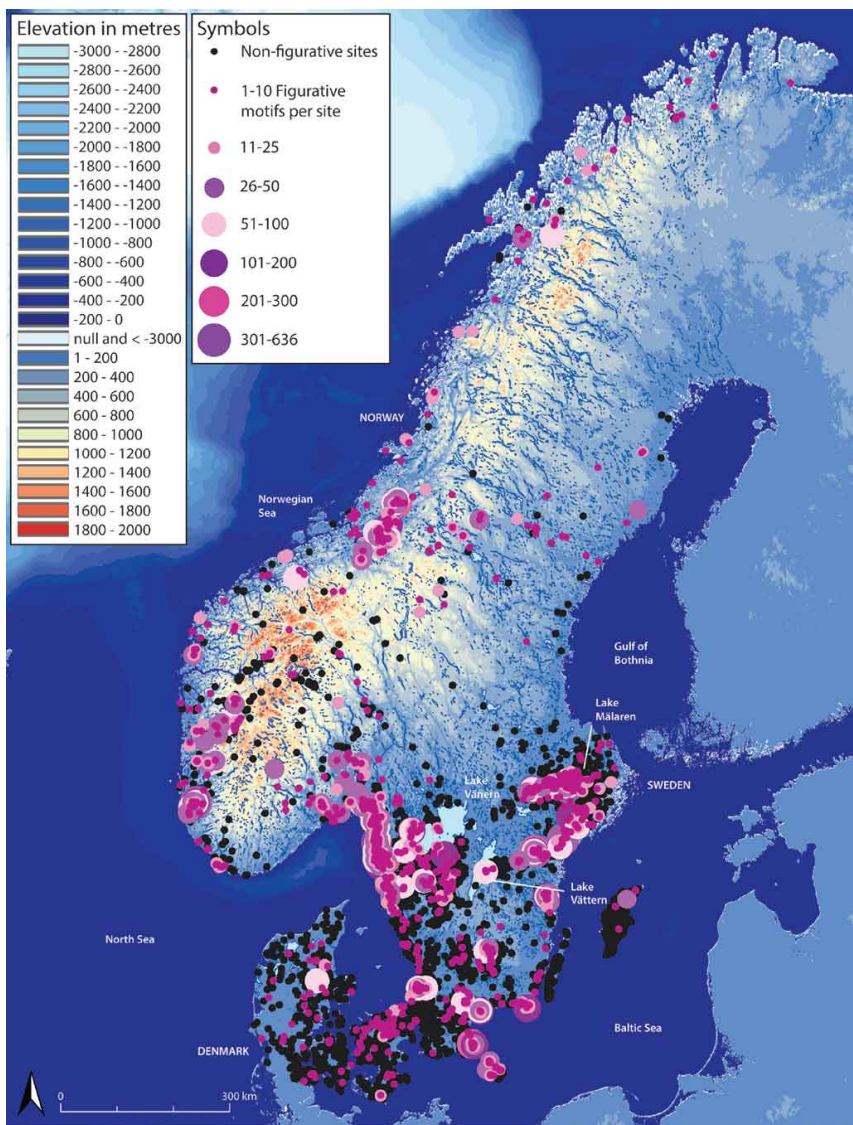


Figure 4.1. Distribution of all figurative and non-figurative motif sites with different size circles representing the different quantities of motifs at each site.

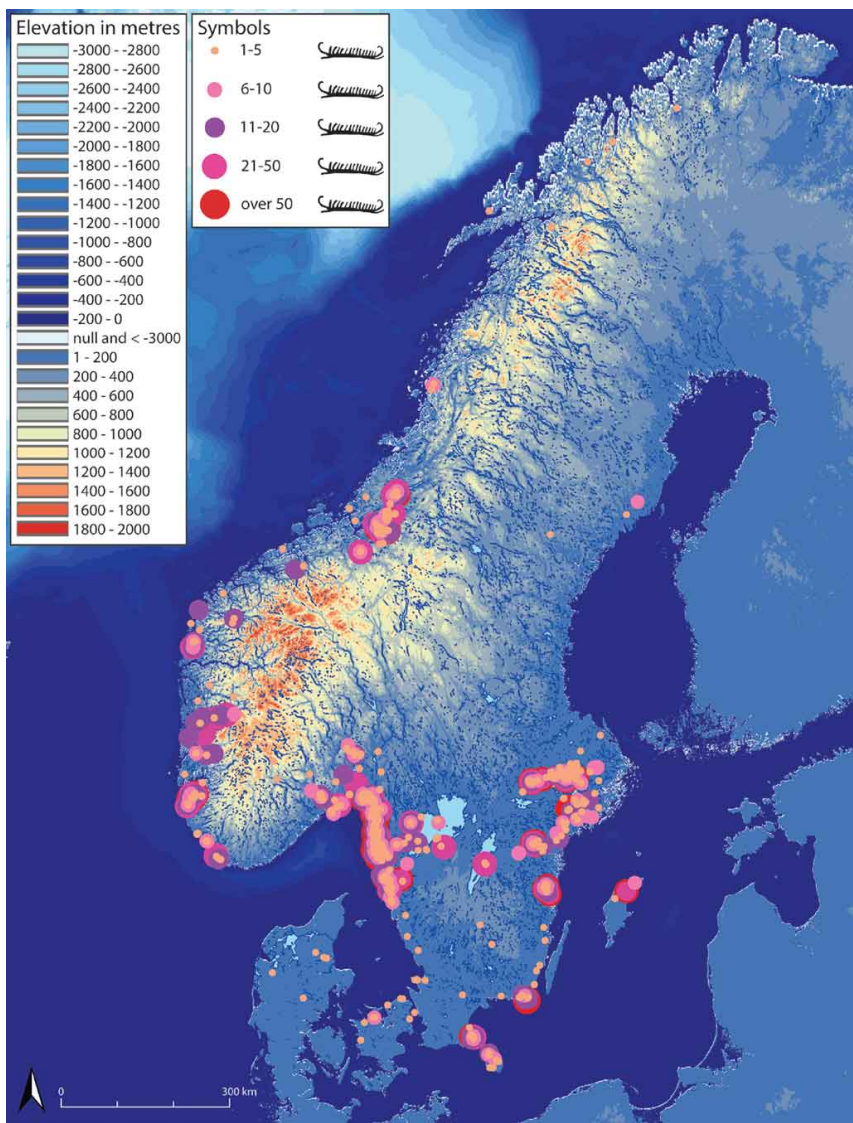
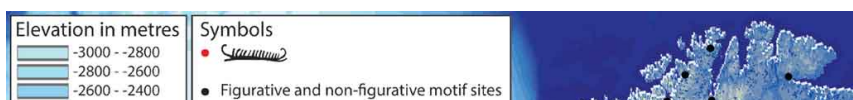


Figure 4.2. Distribution of Ship motif sites in Scandinavia with different size circles representing the different quantities of Ship motifs at each site.



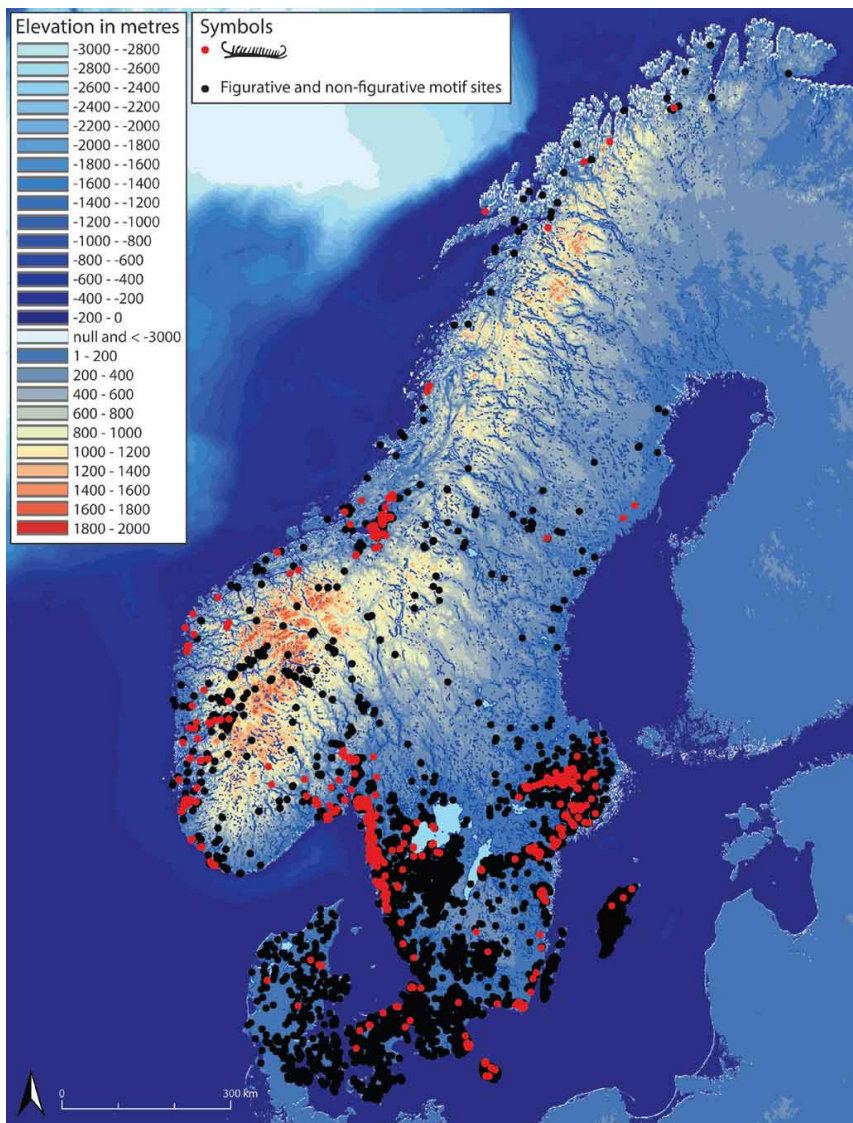


Figure 4.3. Distribution of Ship motif sites (red) and all other rock art sites including Cup Marks (black).

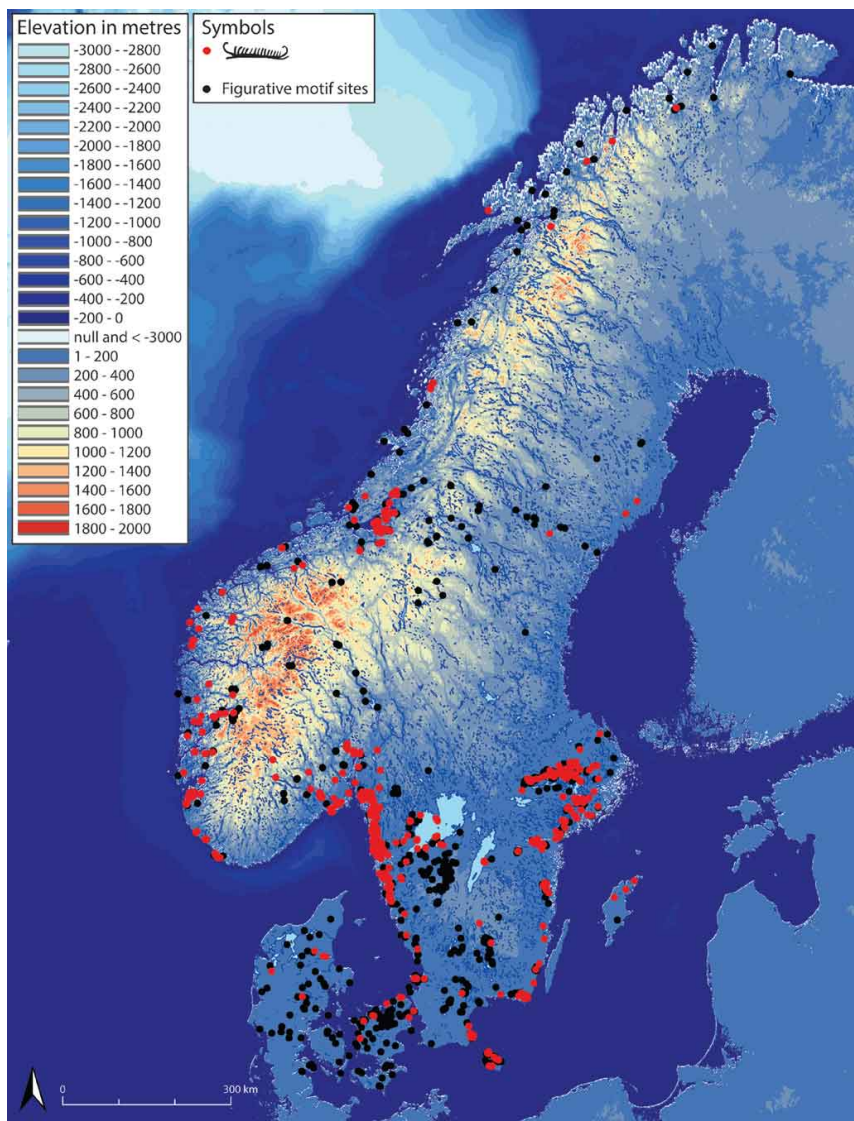


Figure 4.4. Distribution of Ship motifs sites (red) and all other figurative motif sites (black).

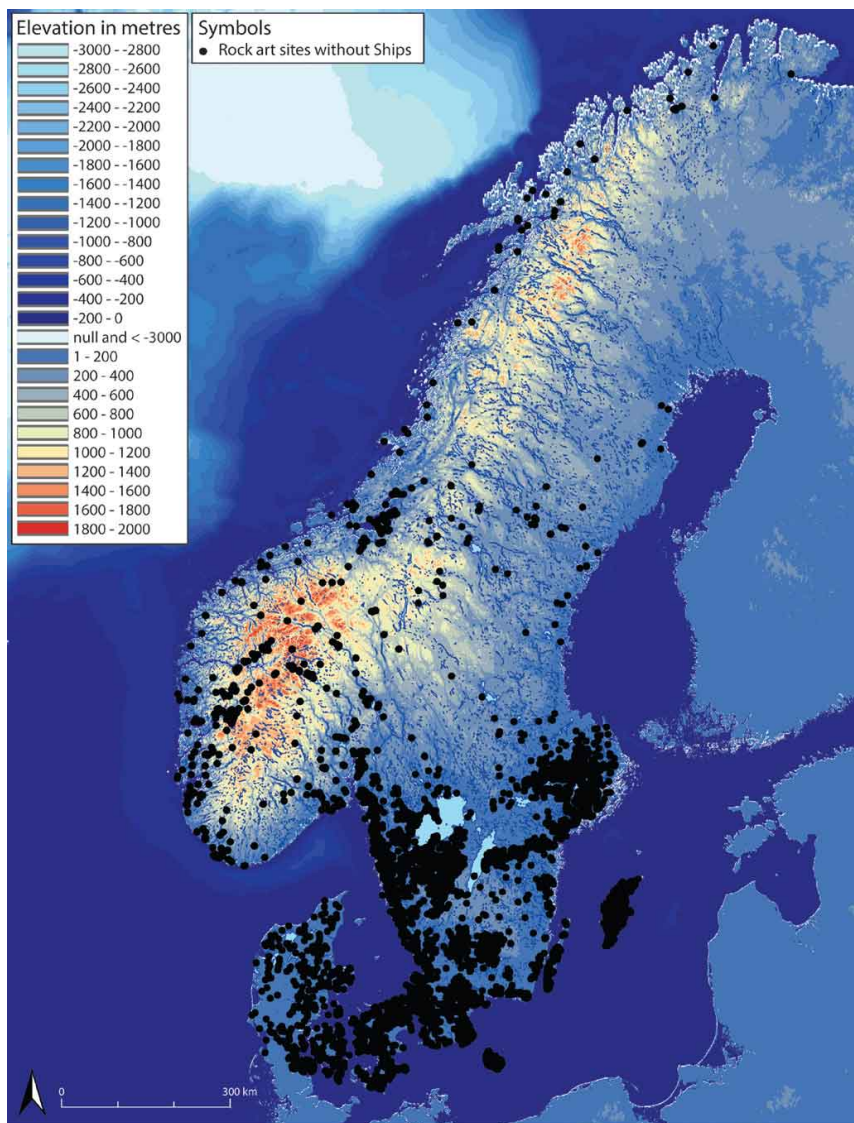


Figure 4.5. Distribution of all rock art sites that do not contain Ship motifs.

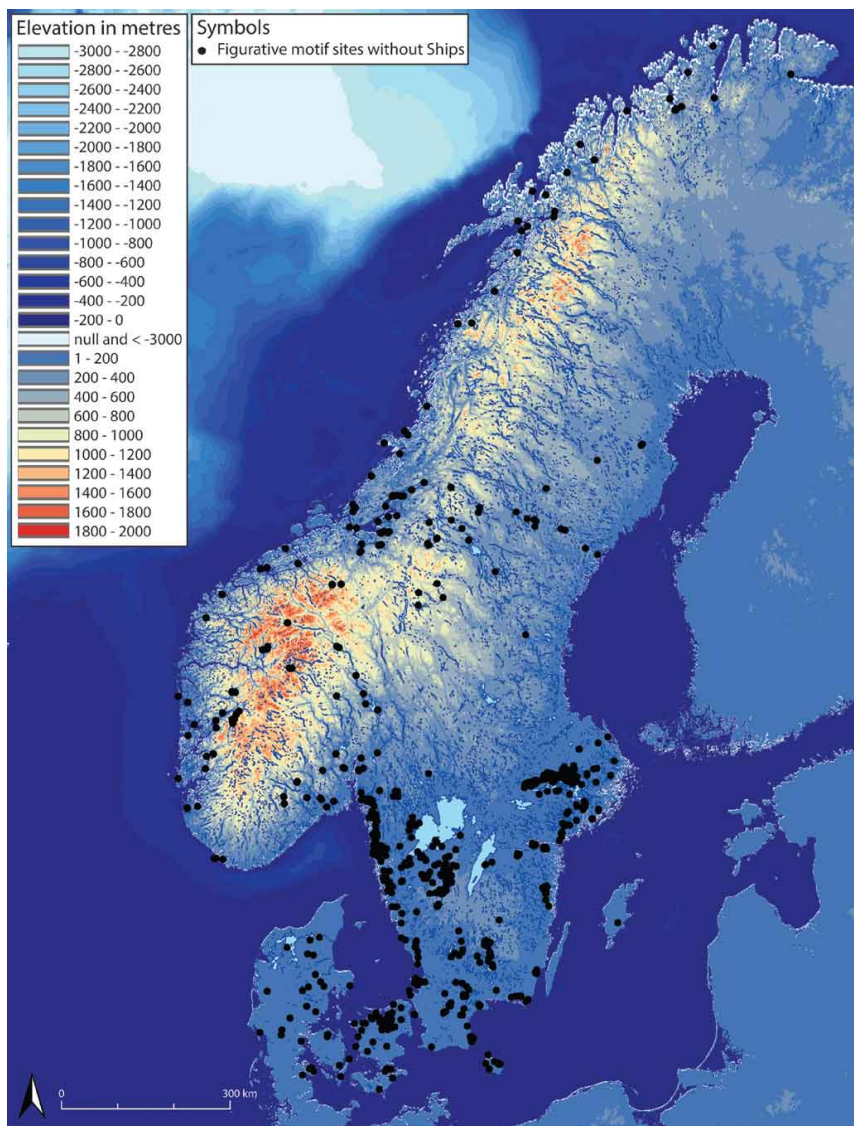


Figure 4.6. Distribution of all figurative motif sites that do not contain Ship motifs.

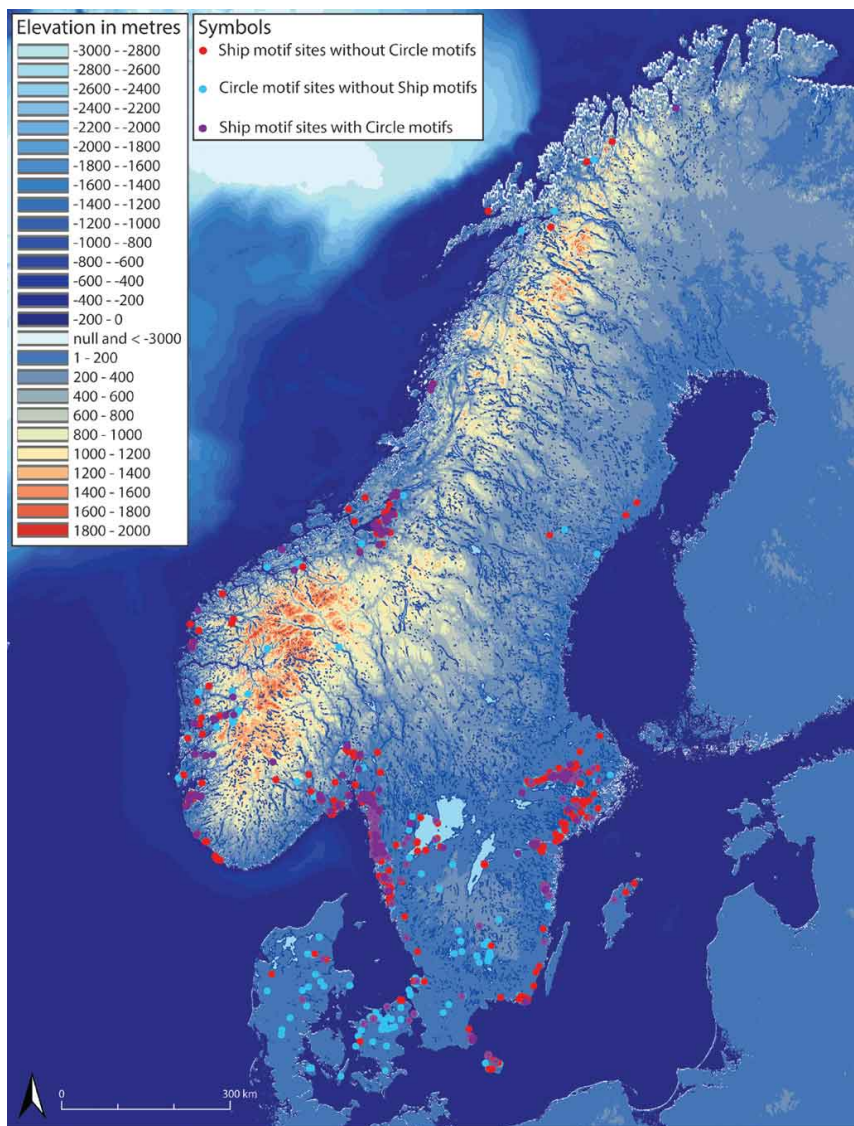


Figure 4.7. Distribution of Ship and Circle motif sites as they occur on their own or together at rock art sites.

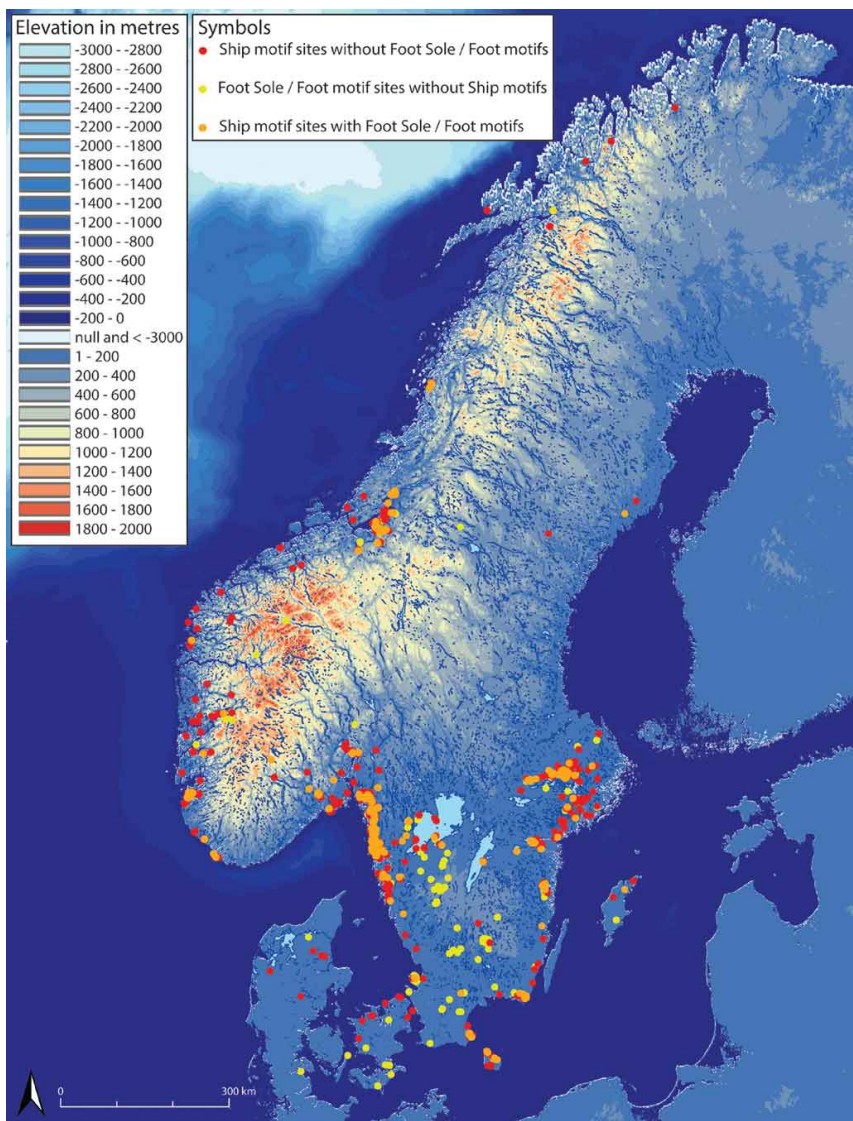


Figure 4.8. Distribution of Ship and Foot Sole/Foot motif sites as they occur on their own or together at rock art sites.

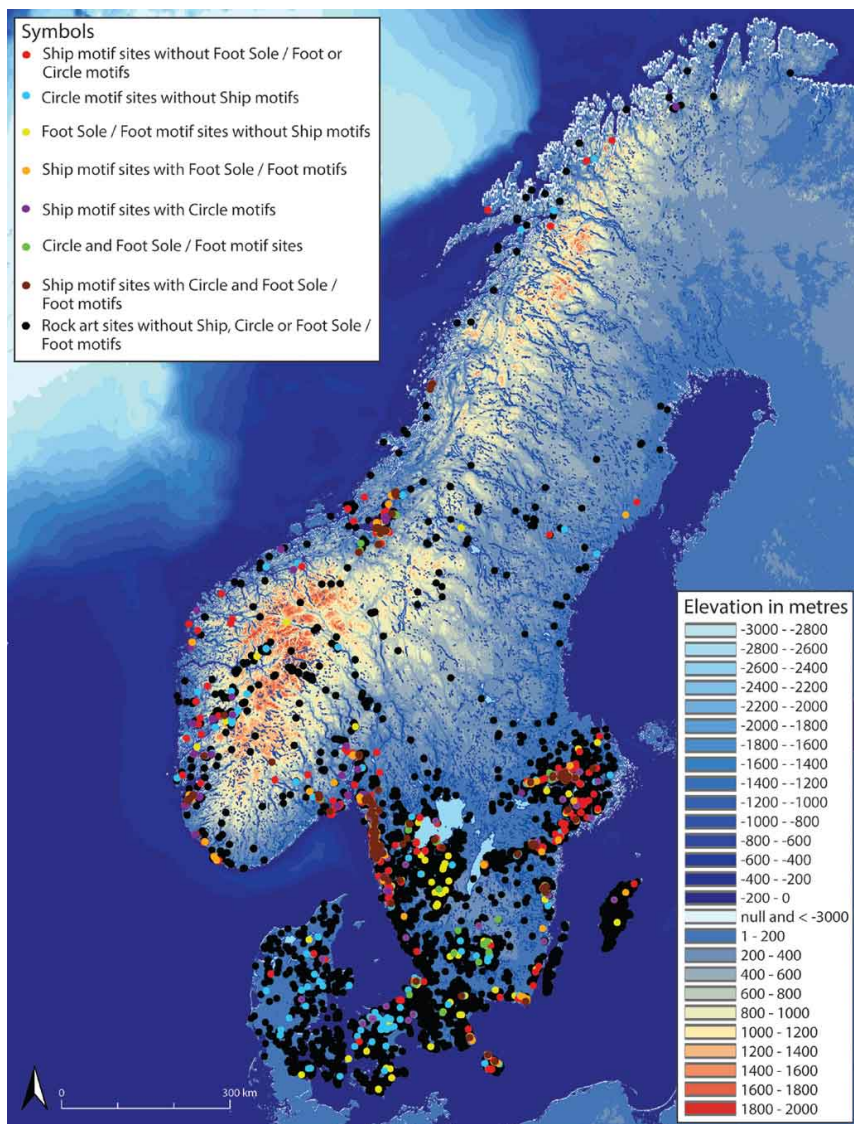


Figure 4.9. Distribution of Ship, Circle, and Foot Sole/Foot motif sites with both figurative and non-figurative motif sites in various combinations as they occur on their own or together at rock art sites.

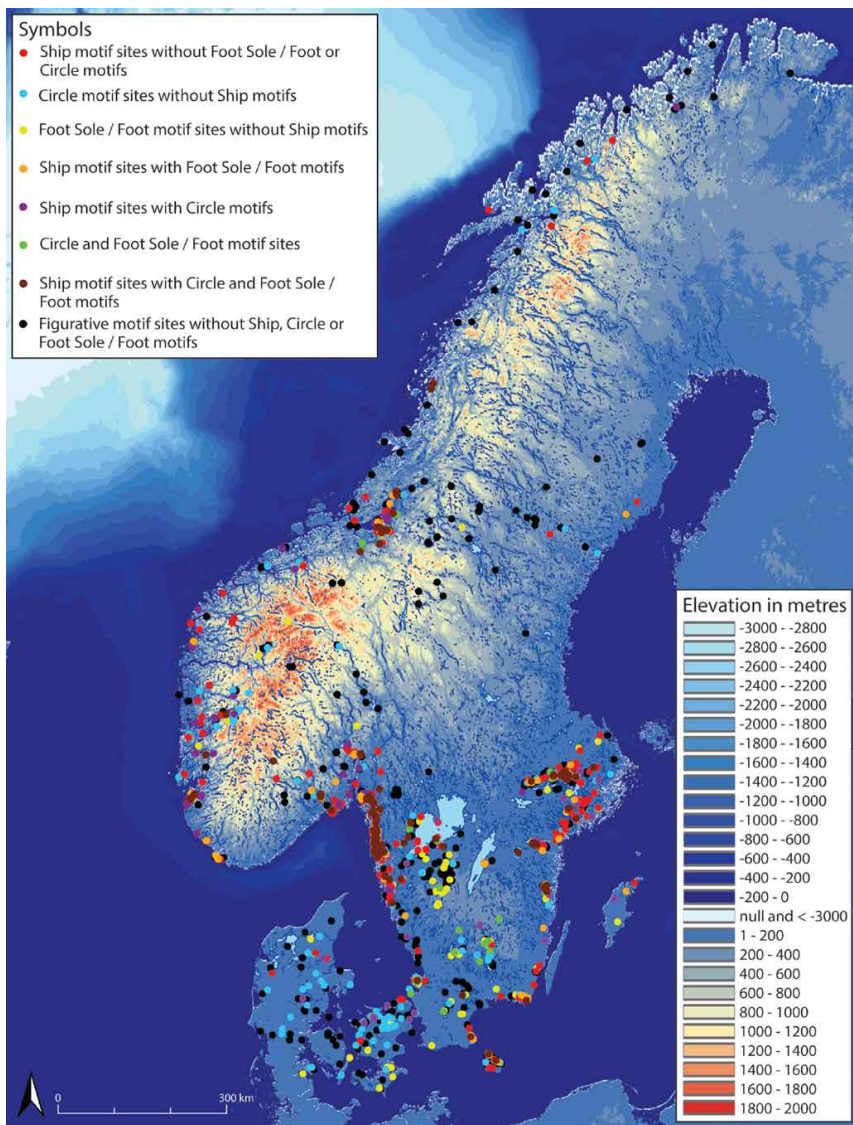


Figure 4.10. Distribution of Ship, Circle, and Foot Sole/Foot motif sites with figurative motif sites in various combinations as they occur on their own or together at rock art sites.

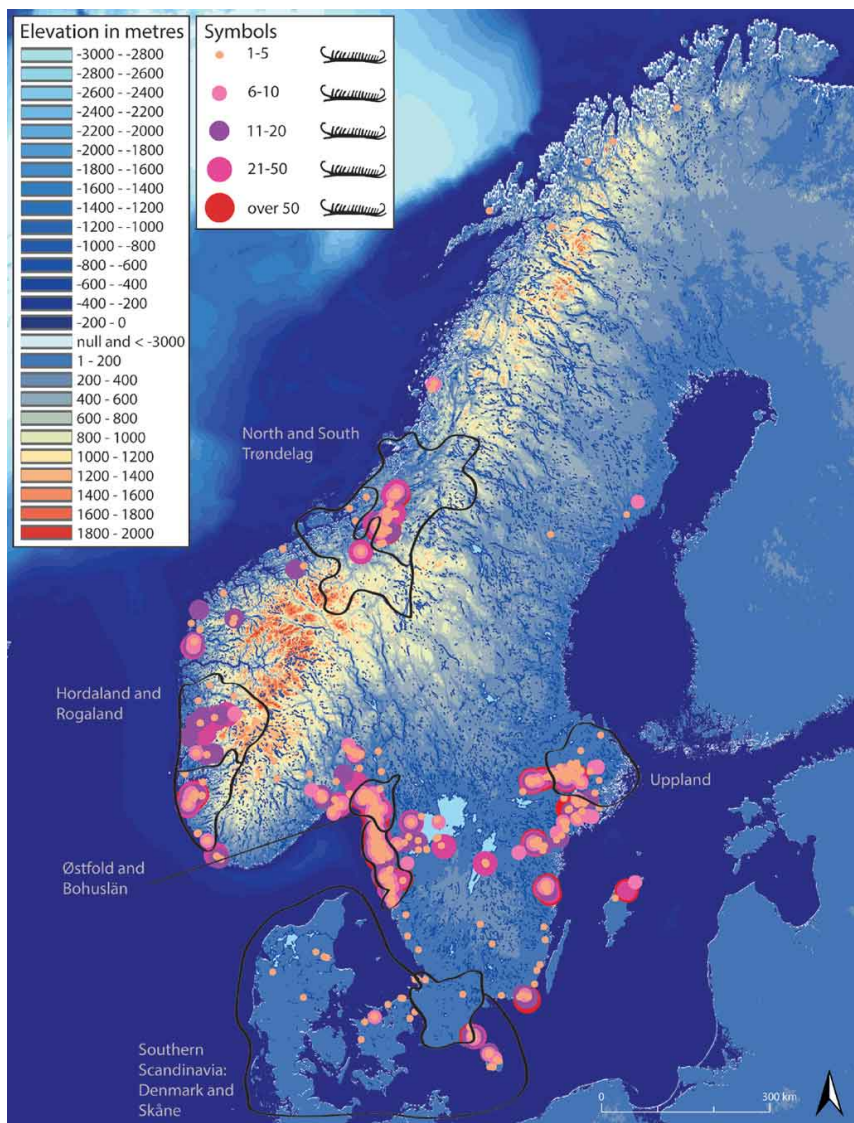


Figure 4.11. Map of site study areas outlined in Scandinavia (counter-clockwise): North and South Trøndelag, Hordaland and Rogaland, Østfold and Bohuslän, Denmark and Skåne, and Uppland.

Table 4.3. Columns A–B: the total number of rock art sites in each country (x region) and Scandinavia. Column C: the total number of Ship sites in x region. Column D: the percentage the total number of Ship sites in x region (Column C) comprise of all rock art sites in x region (Column B). Column E: the total number of Ship motifs present in x region. Column F: the percentage the total number of Ship motifs in x region (Column E) comprise of the total number of Ship motifs in Scandinavia (19,314). Columns G–R: the number of Ship motifs is subsequently broken down by motif concentration: '1–5 Ship motifs' gives the number of sites that contain concentrations of 1–5 Ship motifs, and so forth, and the percentage they comprise of the total number of sites with Ship motifs in x region.

A <i>Region</i>	B <i>Rock art sites</i>	C <i>No. Ship sites</i>	D <i>% of Ship sites in x region</i>	E <i>No. Ship motifs</i>	F <i>% of Ship motifs in x region</i>
Denmark	1337	37	2.77%	120	0.62%
Norway	1420	417	29.37%	3798	19.66%
Sweden	19,287	2,185	11.33%	15,396	79.71%
Scandinavia	22,044	2,639	11.97%	19,314	

A <i>Region</i>	B <i>Rock art sites</i>	G <i>1–5 Ship motifs</i>	H <i>% of Ship sites with 1–5 Ship motifs in x region</i>	I <i>6–10 Ship motifs</i>	J <i>%</i>
Denmark	1337	31	83.78%	4	10.81%
Norway	1420	270	64.75%	57	13.67%
Sweden	19,287	1,519	69.52%	311	14.23%
Scandinavia	22,044	1,823	69.08%	372	14.10%

A <i>Region</i>	B <i>Rock art sites</i>	K <i>11–20 Ship motifs</i>	L <i>%</i>	M <i>21–50 Ship motifs</i>	N <i>%</i>
Denmark	1337	2	5.41%	0	0.00%
Norway	1420	44	10.55%	33	7.91%
Sweden	19,287	208	9.52%	113	5.17%
Scandinavia	22,044	254	9.62%	146	5.53%

A <i>Region</i>	B <i>Rock art sites</i>	O <i>51–200 Ship motifs</i>	P <i>%</i>	Q <i>Over 200 Ship motifs</i>	R <i>%</i>
Denmark	1337	0	0.00%	0	0.00%
Norway	1420	12	2.88%	1	0.24%
Sweden	19,287	32	1.46%	3	0.14%
Scandinavia	22,044	44	1.67%	4	0.15%

Motif occurrences in Scandinavia

Ship motif

Table 4.3 gives the quantity of Ship motifs and the concentrations at which they occur on sites in Scandinavia. Though this book is primarily concerned with the pan-Scandinavian picture, the division by country is also useful as it shows certain unexpected patterns. For example, although 80% of Ship motifs are located in Sweden, there are on average more sites with greater concentrations of Ship motifs in Norway (9.11 Ships per site in Norway versus 7.04 in Sweden). This table also quantifies the observations derived from the distribution maps. In Denmark, there are 1337 rock art sites, yet only 37 of these contain Ship motifs (2.77% of the total rock art sites in Denmark). The Danish Ship motifs comprise less than 1% of the total number of Ship motifs that occur in Scandinavia, quite unlike the nearly 80% that exist in Sweden. The table also shows that the majority of Ship motif sites (69%) appear in relatively low concentrations of between one and five Ship motifs. However, 44 sites contain between 51 and 200 Ship motifs per site, and four sites

contain over 200 Ship motifs per site. This implies that the rarer rock art locations containing large concentrations of Ship motifs on one panel, or on a few panels close together, were special.

Table 4.4. Columns A–B: the total number of rock art sites in each country (x region) and Scandinavia. Column C: the total number of Circle sites in x region. Column D: the percentage the total number of Circle sites in x region (Column C) comprise of all rock art sites in x region (Column B). Column E: the total number of Circle motifs present in x region. Column F: the percentage the total number of Circle motifs in x region (Column C) comprise of the total number of Circle motifs in Scandinavia (3,448). Columns G–P: the number of Circle motifs is subsequently broken down by motif concentration: ‘1–5 Circle motifs’ gives the number of sites that contain concentrations of 1–5 Circle motifs, and so forth, and the percentage they comprise of the total number of sites with Circle motifs in x region.

A	B	C	D	E	F
Region	Rock art sites	No. Circle sites	% of Circle sites in x region	No. Circle motifs	% of Circle motifs in x region
Denmark	1337	62	4.64%	189	5.48%
Norway	1420	198	13.94%	971	28.16%
Sweden	19,287	724	3.75%	2288	66.36%
Scandinavia	22,044	984	4.46%	3448	

A	B	G	H	I	J
Region	Rock art sites	1–5 Circle motifs	% of Circle sites with 1–5 Circle motifs in x region	6–10 Circle motifs	%
Denmark	1337	57	91.94%	3	4.84%
Norway	1420	158	79.80%	16	8.08%
Sweden	19,287	650	89.78%	43	5.94%
Scandinavia	22,044	865	87.91%	62	6.30%

A	B	K	L	M	N
Region	Rock art sites	11–20 Circle motifs	%	21–50 Circle motifs	%
Denmark	1337	1	1.61%	0	0.00%
Norway	1420	14	7.07%	9	4.55%
Sweden	19,287	19	2.62%	11	1.52%
Scandinavia	22,044	34	3.46%	20	2.03%

A	B	O	P
Region	Rock art sites	51–200 Circle motifs	%
Denmark	1337	1	0.53%
Norway	1420	1	0.10%
Sweden	19,287	1	0.04%
Scandinavia	22,044	3	0.09%

Table 4.5. Columns A–B: the total number of rock art sites in each country (x region) and Scandinavia. Column C: the total number of Foot Sole/Foot sites in x region. Column D: the percentage the total number of Foot Sole/Foot sites in x region (Column C) comprise of all rock art sites in x region (Column B). Column E: the total number of Foot Sole/Foot motifs present in x region. Column F: the percentage the total number of Foot Sole/Foot motifs in x region (Column E) comprise of the total number of Foot Sole/Foot motifs in

Scandinavia (4,003). Columns G–R: the number of Foot Sole/Foot motifs is subsequently broken down by motif concentration: ‘1–5 Foot Sole/Foot motifs’ gives the number of sites that contain concentrations of 1–5 Foot Sole/Foot motifs, and so forth, and the percentage they comprise of the total number of sites with Foot Sole/Foot motifs in x region.

A	B	C	D	E	F
Region	Rock art sites	No. Foot Sole/Foot sites	% of Foot Sole/Foot sites in x region	No. Foot Sole/Foot motifs	% of Foot Sole/Foot motifs in x region
Denmark	1337	17	1.27%	47	1.17%
Norway	1420	122	8.59%	985	24.61%
Sweden	19,287	587	3.04%	2971	74.22%
Scandinavia	22,044	726	3.29%	4003	

A	B	G	H	I	J
Region	Rock art sites	1–5 Foot Sole/Foot motifs	% of Foot Sole/Foot sites with 1–5 Foot Sole/Foot motifs in x region	6–10 Foot Sole/Foot motifs	%
Denmark	1337	14	82.35%	2	11.76%
Norway	1420	86	70.49%	12	9.84%
Sweden	19,287	477	81.26%	60	10.22%
Scandinavia	22,044	577	79.48%	74	10.19%

A	B	K	L	M	N
Region	Rock art sites	11–20 Foot Sole/Foot motifs	%	21–50 Foot Sole/Foot motifs	%
Denmark	1337	1	5.88%	0	0.00%
Norway	1420	11	9.02%	9	7.38%
Sweden	19,287	27	4.60%	16	2.73%
Scandinavia	22,044	39	5.37%	25	3.44%

A	B	O	P	Q	R
Region	Rock art sites	51–200 Foot Sole/Foot motifs	%	Over 200 Foot Sole/Foot motifs	%
Denmark	1,337	0	0.00%	0	0.00%
Norway	1,420	4	3.28%	0	0.00%
Sweden	19,287	6	1.02%	1	0.17%
Scandinavia	22,044	10	1.38%	1	0.14%

Non-Ship motifs

The data for Circle motifs is presented in the same format as the Ship motif, but is also broken down into individual tables for Cup and Ring, Ring, Spiral and Sun Cross/Wheel/Wheel Cross (Table 4.4; see Nimura 2013a: tables 5.7–14). It was already observed in the distribution maps that there were far fewer Circle motifs than Ship motifs in Scandinavia as a whole, but this is not the case when we look at individual countries. In Denmark, there are more Circles (189 motifs at 62 sites) than Ships (120 motifs at 37 sites). It is also interesting to note that the average number of Circle motifs per site is significantly lower than the average number of Ship motifs per site in Sweden (2.5 Circles per site) and Norway (3.51 Circles per site). The average numbers of Circle and Ship motifs per site are comparable in Denmark (2.74 Circles per site). When we break down the Circles into the four individual motifs it is the Ring motif that dominates the category, whilst Spirals in general are rare, comprising only 0.04% of all rock art motifs in Scandinavia. Other observations can be made about individual countries. The Cup and Ring and Spiral motifs are less common in Denmark than the rest of Scandinavia. In Denmark, the Sun Cross/Wheel/Wheel Cross motif dominates with 99 motifs at 46 sites.

Table 4.6. The table includes Scandinavia. 'Inland water or Coastal distance' is given in intervals of 1 km. The first interval is broken down into smaller increments, and the last interval includes all distances over 25 km (the furthest Ship site from water in Scandinavia is 101 km). 'Total sites' gives the number of rock art sites that occur within this distance interval. 'Ship sites' gives the total number of Ship sites that occur within this distance interval. 'Number of Ship motifs' gives the number of Ship motifs that occur within this distance interval, and the furthest right column gives the percentage that this number comprises of the total number of Ship motifs in Scandinavia.

<i>Inland water or Coastal Distance</i>	<i>Total sites</i>	<i>Ship sites</i>	<i>No. Ship motifs</i>	<i>% of Ship motifs within defined distance interval out of all Ship motifs (19,314)</i>
0–25 m	514	74	777	4.02%
26–50 m	88	25	175	0.91%
51–100 m	166	31	440	2.28%
101–500 m	1266	144	1745	9.03%
501–1 km	1672	182	1331	6.89%
0–1 km	3706	456	4468	23.13%
1–2 km	4363	483	3091	16.00%
2–3 km	3627	537	3394	17.57%
3–4 km	2409	353	2779	14.39%
4–5 km	1886	355	2285	11.83%
5–6 km	1455	197	1411	7.31%
6–7 km	1126	125	765	3.96%
7–8 km	1012	71	490	2.54%
8–9 km	651	20	182	0.94%
9–10 km	636	22	88	0.46%
10–11 km	413	8	53	0.27%
11–12 km	232	5	12	0.06%
12–13 km	138	1	5	0.03%
13–14 km	93	0	0	0.00%
14–15 km	72	0	0	0.00%
15–16 km	56	0	0	0.00%
16–17 km	26	0	0	0.00%
17–18 km	20	0	0	0.00%
18–19 km	1	0	0	0.00%
19–20 km	1	0	0	0.00%
20–21 km	4	0	0	0.00%
21–22 km	2	0	0	0.00%
22–23 km	0	0	0	0.00%
23–24 km	0	0	0	0.00%
24–25 km	0	0	0	0.00%
25–101 km	57	6	291	1.51%
	21,986	2639	19,314	

Table 4.7. The table includes Scandinavia. 'Coastal distance' is given in intervals of 1 km. The first interval is broken down into smaller increments, and the last interval includes all distances over 25 km (the furthest Ship site from the coastline in Scandinavia is 118 km). 'Total sites' gives the number of rock art sites that occur within this distance interval. 'Ship sites' gives the total number of Ship sites that occur within this distance interval. 'Number of Ship motifs' gives the number of Ship motifs that occur within this distance interval, and the furthest right column gives the percentage that this number comprises of the total number of Ship motifs in Scandinavia.

<i>Coastal Distance</i>	<i>Total sites</i>	<i>Ship sites</i>	<i>No. Ship motifs</i>	<i>% of Ship motifs within defined distance interval out of all Ship motifs (19,314)</i>
0–25 m	64	24	393	2.03%
26–50 m	57	21	154	0.80%
51–100 m	117	27	401	2.08%
101–500 m	778	105	1,292	6.69%
501–1 km	809	131	939	4.86%
0–1 km	1825	308	3179	16.46%
1–2 km	2,618	400	2,599	13.46%
2–3 km	1,846	375	2,258	11.69%
3–4 km	1,262	254	2,621	13.57%
4–5 km	1,083	287	2,222	11.50%
5–6 km	917	238	1,907	9.87%
6–7 km	618	116	881	4.56%
7–8 km	437	91	636	3.29%
8–9 km	213	29	132	0.68%
9–10 km	157	8	105	0.54%
10–11 km	246	6	21	0.11%
11–12 km	255	8	93	0.48%
12–13 km	146	5	24	0.12%
13–14 km	119	7	51	0.26%
14–15 km	127	7	21	0.11%
15–16 km	107	0	0	0.00%
16–17 km	202	4	15	0.08%
17–18 km	86	4	25	0.13%
18–19 km	72	3	6	0.03%
19–20 km	98	6	18	0.09%
20–21 km	106	8	38	0.20%
21–22 km	84	3	15	0.08%
22–23 km	73	4	16	0.08%
23–24 km	128	6	40	0.21%
24–25 km	100	5	12	0.06%
25–118 km	9,061	457	2,379	12.32%
	21,986	2639	19,314	

There are fewer Foot Sole/Foot sites than Circle sites in Scandinavia, when the four Circle types are combined (Table 4.5). Foot Sole/Foot motifs are rare in Denmark, with only 47 recorded, as opposed to 189 Circle motifs or 120 Ship motifs. In Norway, the amounts of Foot Sole/Foot motifs and Circle motifs are comparable, and both quantities are significantly lower than the number of Ship motifs. The densities of Foot Sole/Foot motifs in each country are more similar to Ship motifs than Circle motifs, with a median number of two per site in each country as compared to three Ships per site, and an average of 5.5 per site in each country as compared to 7.29 Ships per site.

Motifs and water in Scandinavia

The patterns that were identified in the distribution maps, such as a lack of Ships in inland areas and the similarity of distribution amongst figurative motifs, are further supported by the distance calculations. The calculation of inland and coastal distances show that the majority of Ship motifs (23.13%) occur within 1 km of the coastline or coastline/inland body of water, and their quantities decrease the further they are from water (Table 4.6). This table also discounts the possibility that there are no Ships in inland areas because rock art was not being made there. Between 13 and 25 km from water there are 275 rock art sites, none of which contain Ship motifs. If we calculate the distances to the coastline only, still the largest percentage of Ship motifs (16.46%) lie within 1 km of the present-day coastline (Table 4.7, Fig. 4.12). The same is observed with Circles. The largest percentage (28%) of Circle motifs is located within 1 km of the present-day coastline or inland body of water (Table 4.8, Fig. 4.13). This percentage is larger than that of the Ship motif, but is most likely due to the smaller total number of Circle motifs. Considering distances to the coastline only, the second largest percentage (16.5%) of Circle motifs is located within 1 km of the coastline. However, the Circle motifs are much more dispersed across the distance intervals than in the first calculation. In fact, the highest percentage of Circle motifs (20.36%) lies between 25 and 68 km (furthest distance of a Circle motif) from the coastline. The key point is that though many Circle motifs are related to the coastline up to a certain distance, the general picture shows that they are more dispersed amongst the distance intervals and therefore not as coastally bound. An even greater percentage of Foot Sole/Foot motifs (29.8%) occurs within 1 km of an inland body of water or the coastline (Table 4.9, Figs 4.14 and 4.15). The Foot Sole/Foot motif, like the Circle motif, shows a connection to water, with 15.34% appearing within 1 km of the coastline. However 30.4% are located further than 25 km from the coastline.

Clearly there is a correlation between Foot Sole/Foot and Circle motifs and watery locales within a certain distance from the coastline. This was seen in the distribution maps, which showed that figurative motifs in general gravitate towards coastal environments. The majority of Circle and Foot Sole/Foot motifs however, appear in more varied environments. This is unlike the Ship motif. Now that we have established certain patterns of motif distribution, motif occurrences and motifs and water on this large scale, we can look at the specific site study areas to assess whether they follow these countrywide and/or Scandinavian-wide patterns (Fig. 4.11). The data presented in the following site study areas broadly

follow the same format as the Scandinavian data. This next section will first investigate the three areas in which known environmental change occurred: Upland in central eastern Sweden, North and South Trøndelag in central Norway, and Østfold and Bohuslän in southeast Norway and western Sweden. It will then investigate two areas where minimal shoreline displacement occurred: Hordaland and Rogaland in southwest Norway, and Denmark and Skåne which comprise southern Scandinavia.

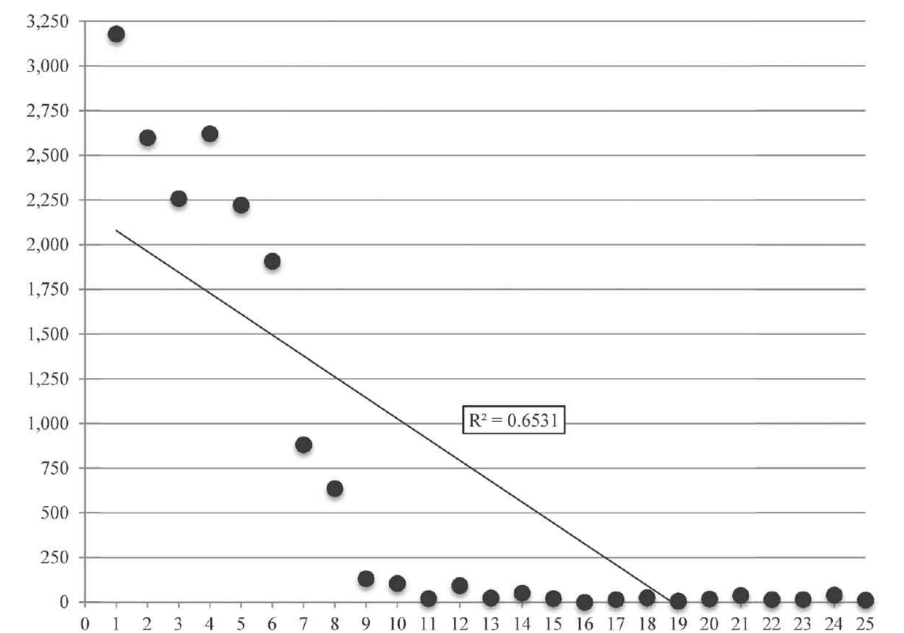


Figure 4.12. The scattergram includes Scandinavia. Scattergram of the coastal distances, where the x-axis gives the distance in kilometres from the site to the coastline, and the y-axis gives the number of Ship motifs that occur in this interval. In this scattergram, the Ship motifs that occur further than 25 km from the coastline are excluded.

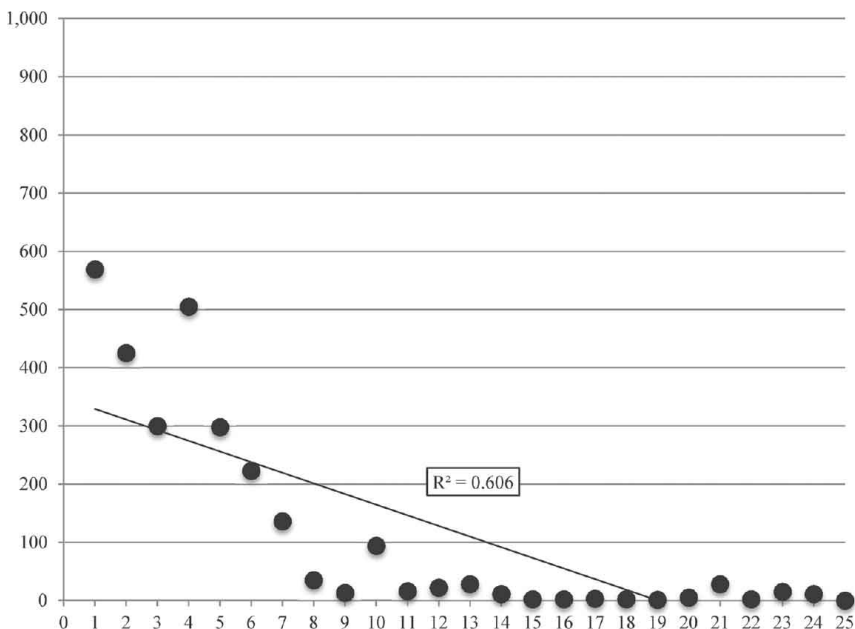


Figure 4.13. The scattergram includes Scandinavia. Scattergram of the coastal distances, where the x-axis gives the distance in kilometres from the site to the coastline, and the y-axis gives the number of Circle motifs that occur in this interval. In this scattergram, the Circle motifs that occur further than 25 km from the coastline are excluded.

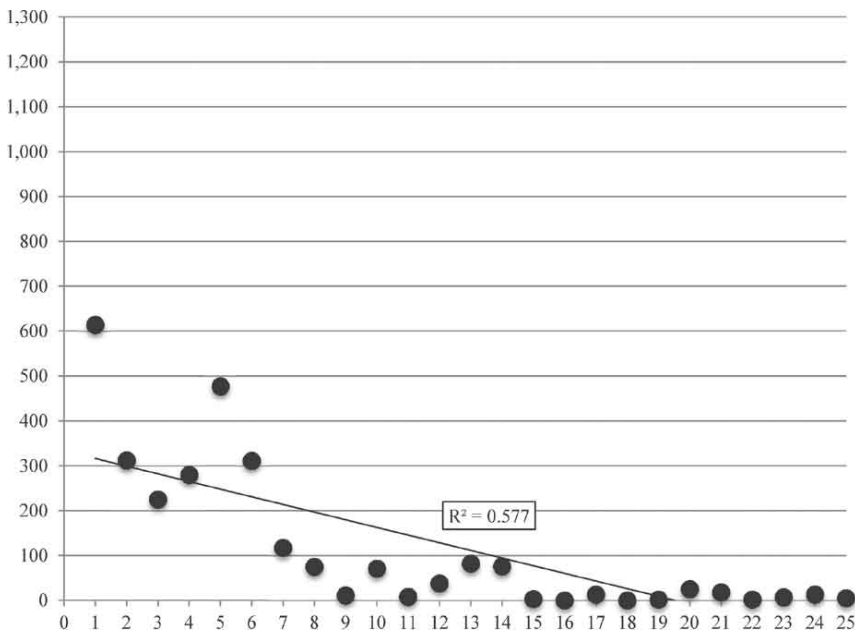


Figure 4.14. The scattergram includes Scandinavia. Scattergram of the coastal distances, where the x-axis

gives the distance in kilometres from the site to the coastline, and the y-axis gives the number of Foot Sole/Foot motifs that occur in this interval. In this scattergram, the Foot Sole/Foot motifs that occur further than 25 km from the coastline are excluded.

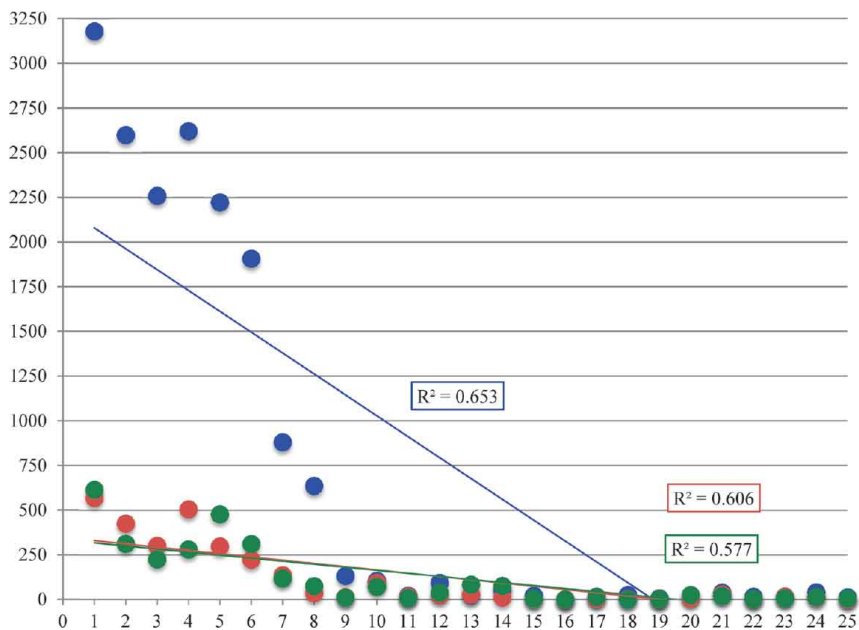


Figure 4.15. The scattergram includes Scandinavia. Scattergram of the coastal distances, where the x-axis gives the distance in kilometres from the site to a body of inland water or to the coastline, and the y-axis gives the number of Ship motifs (blue), number of Circle motifs (orange), and number of Foot Sole/Foot motifs (green) that occur in this interval. In this scattergram, the Ship, Circle and Foot Sole/Foot motifs that occur further than 25 km from the coastline are excluded.

Table 4.8. The table includes Scandinavia. ‘Coastal distance’ is given in intervals of 1 km. The first interval is broken down into smaller increments, and the last interval includes all distances over 25 km (the furthest Circle site from the coastline in Scandinavia is 118 km). ‘Total sites’ gives the number of rock art sites that occur within this distance interval. ‘Circle sites’ gives the total number of Circle (Cup and Ring, Ring, Spiral, Sun Cross/Wheel/Wheel Cross) sites that occur within this distance interval. ‘Number of Circle motifs’ gives the number of Circle motifs that occur within this distance interval, and the furthest right column gives the percentage that this number comprises of the total number of Circle motifs in Scandinavia.

<i>Coastal Distance</i>	<i>Total sites</i>	<i>Circle sites</i>	<i>No. Circle motifs</i>	<i>% of Circle motifs within defined distance interval out of all Circle motifs (3448)</i>
0–25 m	64	13	34	0.99%
26–50 m	57	8	21	0.61%
51–100 m	117	8	68	1.97%
101–500 m	778	60	207	6.00%
501–1 km	809	56	239	6.93%
0–1 km	1825	145	569	16.50%
1–2 km	2618	134	425	12.33%
2–3 km	1846	134	300	8.70%
3–4 km	1262	89	505	14.65%
4–5 km	1083	88	298	8.64%
5–6 km	917	93	223	6.47%
6–7 km	618	41	136	3.94%
7–8 km	437	20	35	1.02%
8–9 km	213	7	13	0.38%
9–10 km	157	9	94	2.73%
10–11 km	246	6	16	0.46%
11–12 km	255	3	22	0.64%
12–13 km	146	3	28	0.81%
13–14 km	119	5	11	0.32%
14–15 km	127	1	2	0.06%
15–16 km	107	2	2	0.06%
16–17 km	202	3	3	0.09%
17–18 km	86	1	2	0.06%
18–19 km	72	1	1	0.03%
19–20 km	98	4	5	0.15%
20–21 km	106	4	28	0.81%
21–22 km	84	1	2	0.06%
22–23 km	73	5	15	0.44%
23–24 km	128	4	11	0.32%
24–25 km	100	0	0	0.00%
25–118 km	9,061	181	702	20.36%
	21,986	984	3448	

Table 4.9. The table includes Scandinavia. ‘Coastal distance’ is given in intervals of 1 km. The first interval is broken down into smaller increments, and the last interval includes all distances over 25 km (the furthest Foot Sole/Foot site from the coastline in Scandinavia is 102 km). ‘Total sites’ gives the number of rock art sites that occur within this distance interval. ‘Foot Sole/Foot sites’ gives the total number of Foot Sole/Foot sites that occur within this distance interval. ‘Number of Foot Sole/Foot motifs’ gives the number of Foot Sole/Foot motifs that occur within this distance interval, and the furthest right column gives the percentage that this

number comprises of the total number of Foot Sole/Foot motifs in Scandinavia.

<i>Coastal Distance</i>	<i>Total sites</i>	<i>Foot Sole/Foot sites</i>	<i>No. Foot Sole/Foot motifs</i>	<i>% of Foot Sole/Foot motifs within defined distance interval out of all Foot Sole/Foot motifs (4003)</i>
0–25 m	64	6	90	2.25%
26–50 m	57	10	35	0.87%
51–100 m	117	6	61	1.52%
101–500 m	778	41	239	5.97%
501–1 km	809	34	189	4.72%
0–1 km	1825	97	614	15.34%
1–2 km	2,618	66	312	7.79%
2–3 km	1,846	72	225	5.62%
3–4 km	1,262	62	280	6.99%
4–5 km	1,083	43	477	11.92%
5–6 km	917	74	311	7.77%
6–7 km	618	29	117	2.92%
7–8 km	437	18	75	1.87%
8–9 km	213	6	11	0.27%
9–10 km	157	6	71	1.77%
10–11 km	246	3	8	0.20%
11–12 km	255	2	38	0.95%
12–13 km	146	7	82	2.05%
13–14 km	119	4	76	1.90%
14–15 km	127	3	3	0.07%
15–16 km	107	0	0	0.00%
16–17 km	202	3	13	0.32%
17–18 km	86	0	0	0.00%
18–19 km	72	1	2	0.05%
19–20 km	98	4	25	0.62%
20–21 km	106	4	18	0.45%
21–22 km	84	1	2	0.05%
22–23 km	73	1	7	0.17%
23–24 km	128	3	13	0.32%
24–25 km	100	3	5	0.12%
25–102 km	9061	214	1218	30.43%
	21,986	726	4003	

Table 4.10. Uppland: from top to bottom, in order from greatest to least quantity. Column A: the figurative and non-figurative motif name (x motif). Column B: the total amounts of figurative and non-figurative motifs in Uppland. Column C: the percentage x motif (Column B) comprises of the total number of motifs in Uppland (45,076). Column D: the total number of x motif in Scandinavia. Column E: the percentage the total of x motif in Uppland (Column B) comprises of the total number of x motif in Scandinavia (Column D). Column F:

the percentage the total number of *x* motif (Column B) comprises of all figurative and non-figurative motifs in Scandinavia (311,483). The grey cells represent the motifs that are originally from F/SE and only occur within that dataset.

	A <i>Motif</i>	B <i>Total in Uppland</i>	C <i>% x motif in region comprises of all motifs in region</i>	D <i>Total in Scandinavia</i>	E <i>% x motif in region comprises of x motifs in Scandinavia</i>	F <i>% x motif in Scandinavia comprises of all motifs in Scandinavia</i>
1	Cup Mark	41,098	91.17%	257,167	15.98%	82.56%
2	Ship	1799	3.99%	19,322	9.31%	6.20%
3	Oval	554	1.23%	2315	23.93%	0.74%
4	Foot Sole/Foot	445	0.99%	4005	11.11%	1.29%
5	Indefinable	264	0.59%	8361	3.16%	2.68%
6	Animal	188	0.42%	4565	4.12%	1.47%
7	Groove-shaped Depression	177	0.39%	2436	7.27%	0.78%
8	Human	158	0.35%	4649	3.40%	1.49%
9	Ring	133	0.30%	2014	6.60%	0.65%
10	Other Definable	67	0.15%	1587	4.22%	0.51%
11	Grinding Groove	50	0.11%	1101	4.54%	0.35%
12	Sun Cross/Wheel/Wheel Cross	46	0.10%	897	5.13%	0.29%
13	Cup and Ring	45	0.10%	412	10.92%	0.13%
14	Grinding Surface	27	0.06%	1182	2.28%	0.38%
15	Weapon	10	0.02%	511	1.96%	0.16%
16	Cross	4	0.01%	87	4.60%	0.03%
17	Ground Oval Depression	3	0.01%	15	20.00%	0.00%
18	Spiral	3	0.01%	128	2.34%	0.04%
19	Tree	3	0.01%	63	4.76%	0.02%
20	Wheeled Vehicle	2	0.00%	160	1.25%	0.05%
21	Colour Panel	0	0.00%	43	0.00%	0.01%
22	Frame	0	0.00%	255	0.00%	0.08%
23	Hand/Arm	0	0.00%	37	0.00%	0.01%
24	Net	0	0.00%	30	0.00%	0.01%
25	Plough	0	0.00%	32	0.00%	0.01%
26	Tool	0	0.00%	33	0.00%	0.01%
27	Track Mark	0	0.00%	76	0.00%	0.02%
	Total	45,076		311,483		

Uppland: central eastern Sweden

Gunnar Ekholm published the first major study of rock art in Uppland in 1915. It was the key source for this material before Einar Kjellén's thorough survey was published in 1976. Kjellén's published works and archive would later form the base for Coles' (1994; 2000) and Ling's (2012) studies. This section presents the same data as in the previous section, but differs slightly from the rest of the site studies, for it will also investigate a few different analyses based on data provided by Ling (2012) and on recent palaeogeographical reconstructions (Sund 2010).

Environmental change and chronology in Uppland

Coles' (2000) distribution maps of rock art in Uppland include hypothetical Bronze Age shorelines. He claims that in 1800 BC the shoreline was c. 25 m.a.s.l. falling to 20 m.a.s.l. by the end of the 2nd millennium BC (Coles 2000, 98–108). Coles in no way argues that this is sufficient for modelling exact Bronze Age locations of rock art, as the changes would have been dynamic when marine transgressions and regressions were intertwined with glacio-isostatic shifts. Yet his maps are compelling as they resituate many of the panels in a watery landscape. Ling's

(2012) survey of the rock art in Uppland is the most recent of a number of Uppland-wide studies and the most detailed in regards to environmental data. He uses a similar methodology to that which he employed in Bohuslän using altitude measurements and geological data (Ling 2014). Using recent geological studies, Ling (2012, 21: fig. 11.1) interprets the shoreline altitudes as follows:

2300.B.C.l.
 2300.B.C.l.
 2300.B.C.l.
 1800.B.C.l.
 900mB.C.s.l.
 750mB.C.s.l.

With these data he produces meticulous reconstructions of Bronze Age shorelines at specific panels in Uppland. By reconstructing the Bronze Age shorelines he is able to date the carvings by using both typological dating and shoreline dating methods. Just as Coles claimed, Ling's work also resituates a majority of the Uppland carvings in close proximity to watery locations.

Trøndelag, Østfold and Bohuslän, which feature in this chapter, also experienced visible shoreline displacement. Published studies show that rock art in these areas tended to have a longer chronology extending into the Early Iron Age, and that the connection of rock art to water continued even into this later period of prehistory. This longer chronology does not exist in Uppland, where there are few Ship motifs dated to the Pre-Roman Iron Age. Generally speaking, the chronology of rock art in Uppland is weighted towards the Early Bronze Age periods I–III, with a distinct decline in production after Period V (Ling 2012). Ling claims that the scarcity of Pre-Roman Iron Age carvings is possibly due to the lack of suitable bedrock surfaces in this period, as they were covered by 'glacial and postglacial clays' (2012, 21). Interestingly, Skoglund (2015) argues that Uppland displays more similarities with other Baltic countries than with southern Scandinavia (Denmark and southern Sweden) around the Late Bronze Age Period V (900–700 BC). His evidence stems mostly from land management/use and the circulation of iron artefacts. Perhaps this stronger cultural connection to the Eastern Baltic countries helps explain the shorter chronology of the rock art tradition in Uppland, as compared to the longer chronologies in Østfold, Bohuslän and Trøndelag. Or perhaps the lack of Pre-Roman Iron Age carvings is indicative of a decisive response to environmental change. Is it possible that they relinquished the tradition as the shoreline disappeared?

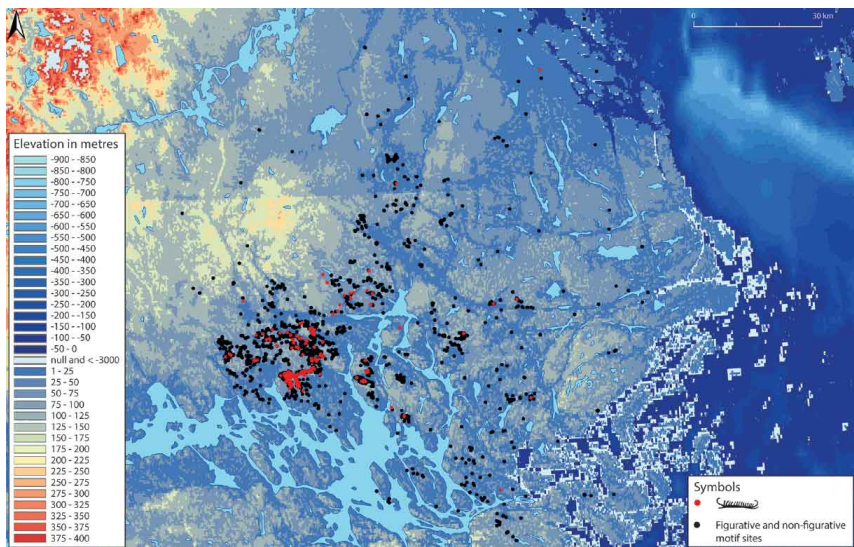


Figure 4.16. Distribution of Ship motif sites (red) and all other rock art sites including Cup Marks (black) in Uppland.

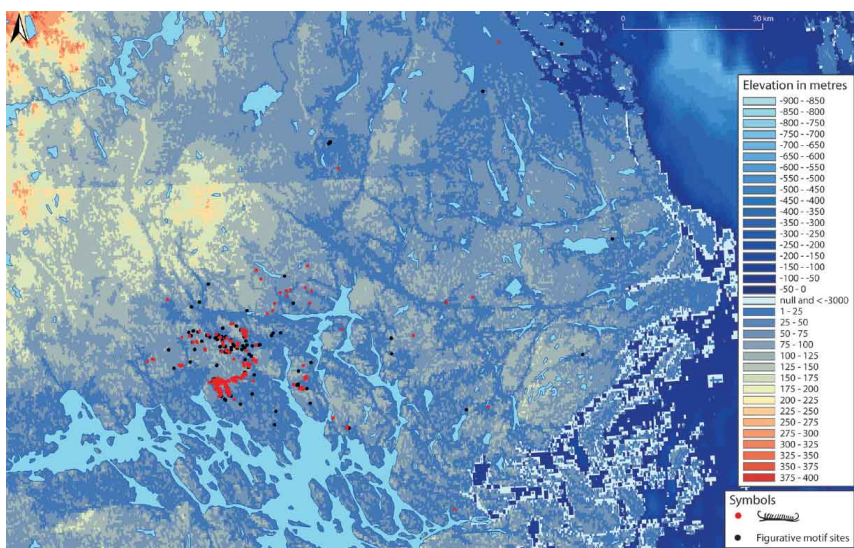


Figure 4.17. Distribution of Ship motif sites (red) and all other figurative motif sites (black) in Uppland.

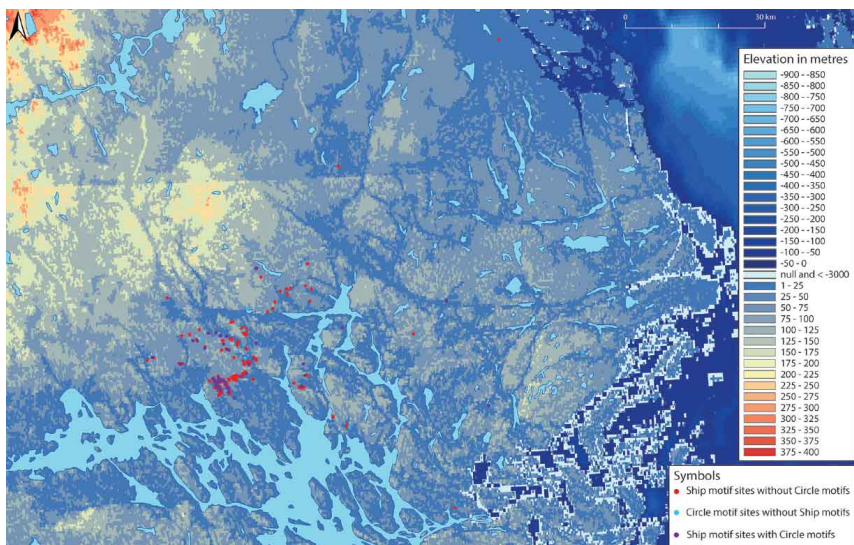


Figure 4.18. Distribution of Ship motif sites with Circle motifs in Uppland.

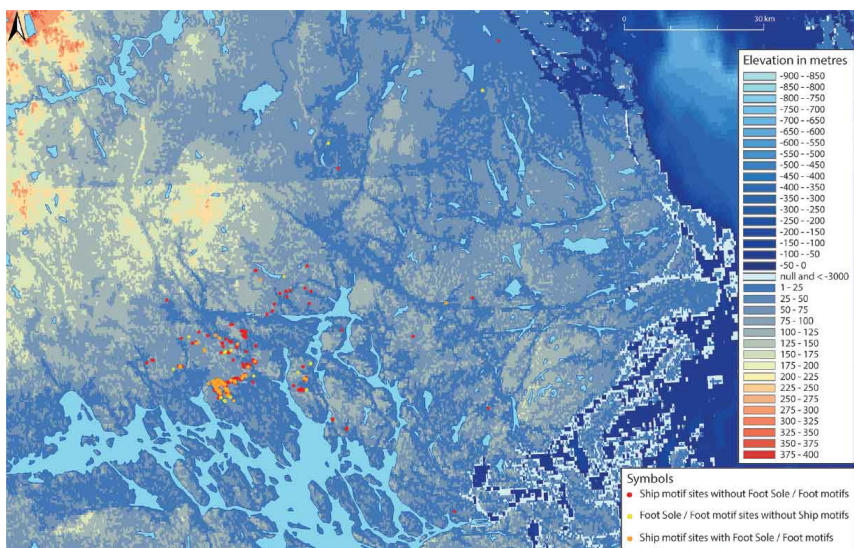


Figure 4.19. Distribution of Ship motif sites with Foot Sole/Foot motifs in Uppland.

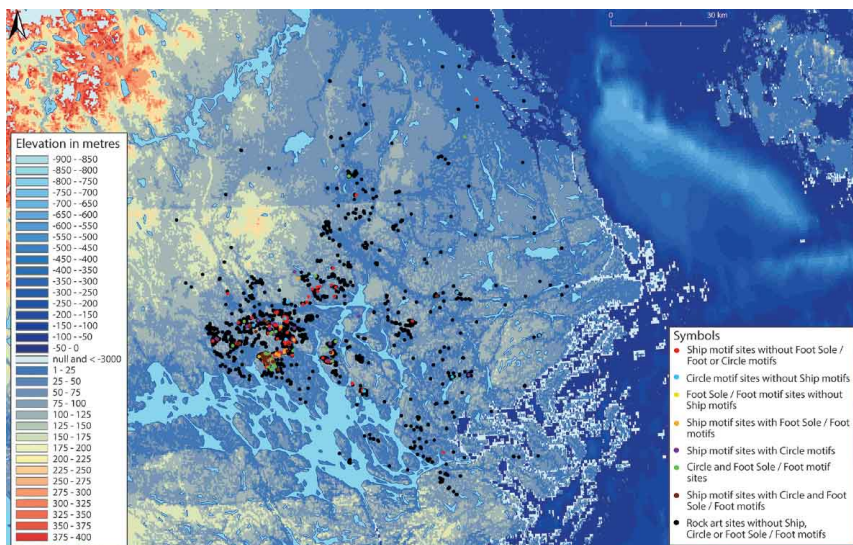


Figure 4.20. Distribution of Ship, Circle and Foot Sole/Foot motif sites with both figurative and non-figurative motif sites in various combinations as they occur on their own or together at rock art sites in Uppland.

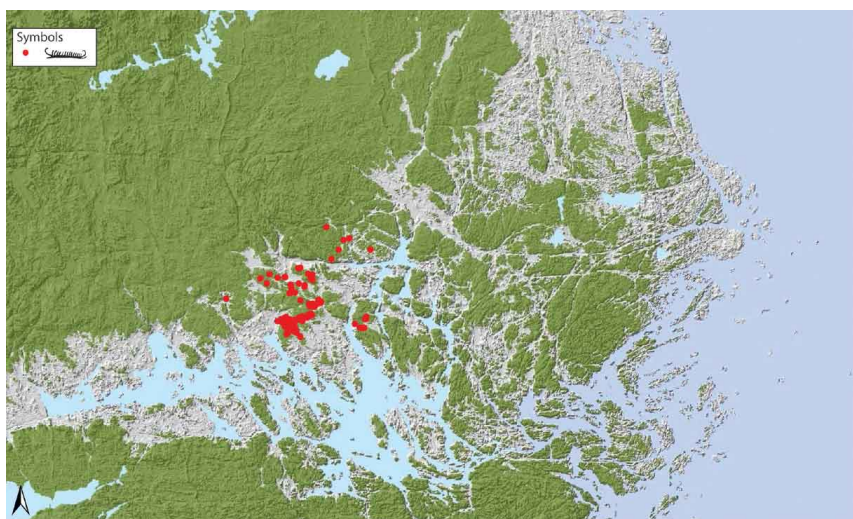


Figure 4.21. Distribution of Ship motif sites in Uppland. The palaeolandscape map (from Sund 2010) is a reconstruction of the Uppland landscape at 3500 cal BP (c. 1550 BC). The green represents land in 1550 BC and the grey represents land in present day.

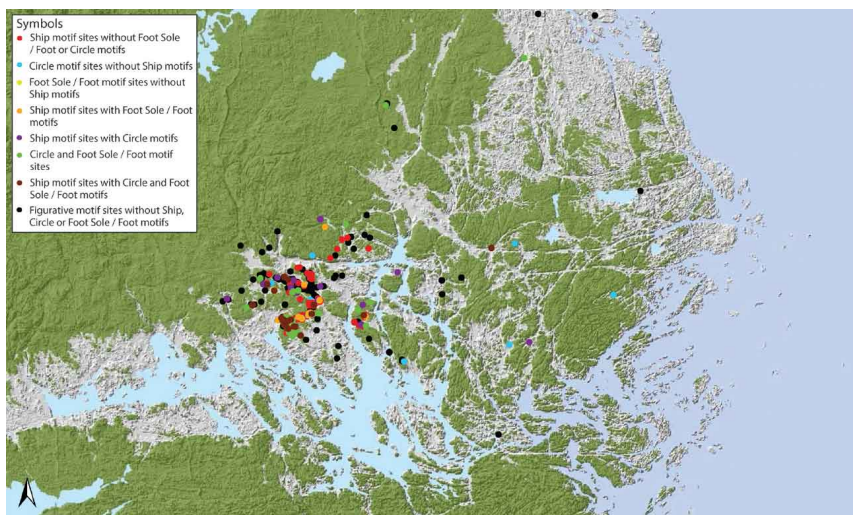


Figure 4.22. Distribution of Ship motif sites with Spiral, Cup and Ring, Ring, Sun Cross/Wheel/Wheel Cross and Foot Sole/Foot motifs in Uppland. The palaeolandscape map (from Sund 2010) is a reconstruction of the Uppland landscape at 3500 cal BP (c. 1550 BC). The green represents land in 1550 BC and the grey represents land in present day.

Motif distributions in Uppland

The distribution maps show quite clearly that the rock art in Uppland is concentrated around Lake Mälaren instead of being clustered around the coastline (Fig. 4.16–20). The topographic maps show that these sites appear to be situated not on the present-day lake's edge, but rather on the edge of the historical floodplain. Because of this it is likely that the distance-to-water calculations will be affected by the use of present-day water data. But the distribution maps emphasise certain patterns of their own. The first is that the greatest concentration of Ship motifs is just north of Lake Mälaren (Fig. 4.17). The second is that the non-figurative and figurative sites that do not contain Ship, Circle or Foot Sole/Foot motifs (black dots) cover a wide area, whereas the Ship, Circle and Foot Sole/Foot motifs are clustered together in one main concentration north of Lake Mälaren (Fig. 4.20). The third is that the majority of the figurative rock art sites in general tend to be at low elevations, whilst the non-figurative rock art sites are spread over a larger area and occur further inland and at higher elevations (Fig. 4.16 compared to Fig. 4.17).

What will be revealed in the distance calculations following is that the Uppland analyses do not show as significant a relationship to the coastline or to an inland body of water as some of the site study areas discussed in this book. However, in Uppland we have an opportunity to use palaeogeographic reconstruction maps that Camilla Sund (2010) created for 7000 years of later prehistory. These maps show the permeation of Uppland's landscape by a maze of water channels in and around Lake Mälaren, the Stockholm peninsula and the Baltic Sea. Sund's study covers a larger region than Ling's, so it is beneficial to include it here. In her maps she depicts the landscape every 1000–500 years. By georeferencing two of these maps into ScanGIS and using the motif dates provided by Ling, these distribution maps

draw a general picture of the distribution of Ship motifs in the Early Bronze Age and Late Bronze Age. Though Ling (2012, 9–12) champions the inclusion of detailed environmental data in archaeological studies, he has also warned of the dangers of uncritically adopting and applying data from the natural sciences. And though obviously the dates of the maps presented here are hypothetical reconstructions, they are still useful for providing a general picture of this site study area.

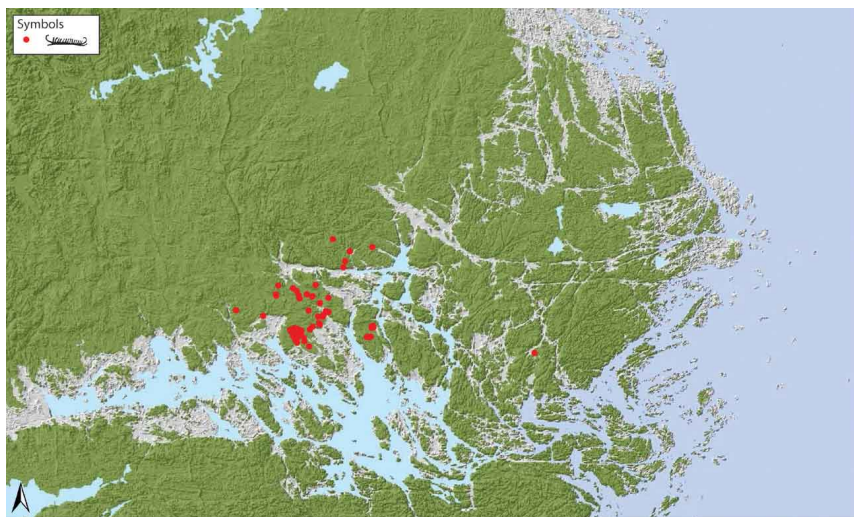


Figure 4.23. Distribution of Ship motif sites in Uppland. The palaeolandscapes map (from Sund 2010) is a reconstruction of the Uppland landscape at 2500 cal BP (c. 550 BC). The green represents land in 550 BC and the grey represents land in present day.

The first map is dated 3500 cal yr BP (c. 1550 BC) and is used as a backdrop for the Early Bronze Age rock art. The second map is dated 2500 cal yr BP (c. 550 BC) and is used for the Late Bronze Age rock art. Figure 4.21 is a distribution map of the Early Bronze Age Ship motif sites. Figure 4.22 plots these same Early Bronze Age Ship sites but also includes the Circle and Foot Sole/Foot motifs. Unfortunately Circle and Foot Sole/Foot motifs have not been dated as specifically as Ships and therefore represent a general Bronze Age distribution on an Early Bronze Age map. Figures 4.23 and 4.24 use the same method to show the distribution of Late Bronze Age Ship sites. In each map, the green represents the land in 1550 and 550 BC respectively and the grey represents what is land in present day. What these maps show quite clearly is that the Ship motifs are clustered on what were, according to Sund's reconstructions, patches of land amidst a watery landscape. This example demonstrates the great changes that occurred to the Uppland landscape in the Bronze Age. It also confirms that the distance calculations, presented below, are meaningful, even if they can only be discussed relatively in relation to present-day water.

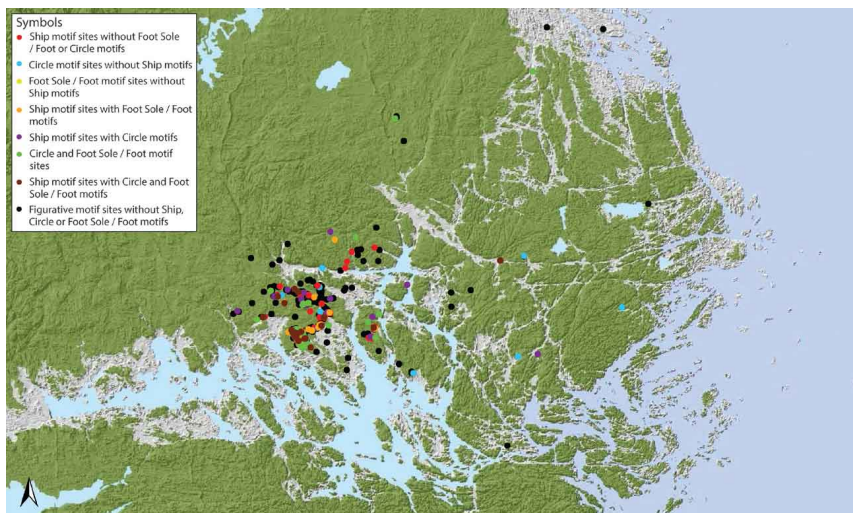


Figure 4.24. Distribution of Ship motif sites with Spiral, Cup and Ring, Ring, Sun Cross/Wheel/Wheel Cross and Foot Sole/Foot motifs in Uppland. The palaeolandscape map (from Sund 2010) is a reconstruction of the Uppland landscape at 2500 cal BP (c. 550 BC). The green represents land in 550 BC and the grey represents land in present day.

Motif occurrences in Uppland

Nearly 15% of all rock art motifs in Scandinavia are located in Uppland, so it is surprising that this region, known for its ornate Ship imagery, contains only 9% of the Ship motifs in Scandinavia. This is a slight figure compared to the 58% contained in Østfold and Bohuslän. However, Uppland's 9% make it the 2nd highest concentration of Ship motifs of the five site study areas (Table 4.15a–b). And as we will soon observe in the other site study areas, the Ship motif is still the highest occurring figurative motif in Uppland, occurring on nearly 13% of all rock sites (Table 4.10). The densities of Ship motifs at Ship sites are more diverse than in Østfold and Bohuslän, as there are three sites containing between 51 and 200 Ship motifs and one site containing over 200 Ship motifs.

Circle motifs exist on 13% of the rock art sites in Uppland and are the 4th highest occurring figurative motif. Interestingly they represent the smallest quantity of Circle motifs of any of the site study areas, barely 7% of all Circle motifs in Scandinavia. Circles in Uppland are dominated by Ring motifs, which represent nearly 7% of all Ring motifs in Scandinavia. Even though the total number of Circles is much less than in the other site study areas, there are more Sun Cross/Wheel/Wheel Cross motifs than in Trøndelag or Hordaland and Rogaland, which are dominated by Ring motifs and Cup and Ring motifs. It is also notable that of the 85 sites that contain Circle motifs, 62 (73%) of these sites also contain a Ship motif.

Foot Sole/Foot motifs in Uppland comprise 11% of the total number of this motif in Scandinavia. This is equal to that in Denmark and Skåne (11%), despite the fact that southern Scandinavia represents a much larger region geographically. This percentage is also comparable to the 15% that are located in Trøndelag. Yet though the Foot Sole/Foot motif is the 3rd highest occurring motif in Uppland,

they amount to the 2nd smallest quantity of the five site study areas, occurring on a mere 4% of all rock art sites the region. Only Hordaland and Rogaland has significantly fewer Foot Sole/Foot motifs. They also occur in weaker densities, with almost 89% of Foot Sole/Foot sites containing only one to five of this motif per site.

Motifs and water in Uppland

Uppland is a special case, as most of the rock art sites in this province are situated around Lake Mälaren, which was previously a bay, instead of along the coastline. Because of this, distances were calculated to the coast and inland water as well as to the coastline only. The difference is immediately evident. If we calculate distances to the coastline only, 99% of all Ship motifs, 92% of Circle motifs and 99% of Foot Sole/Foot motifs occur further than 25 km from the coastline. If we look at the inland *and* coastal distances the picture is quite different. We have already noted in the palaeogeographical reconstructions, however, that even the inland and coastal distances will likely present weaker results due to the environmental changes that transpired around Lake Mälaren.

The majority of Ship motifs are located between 0 and 12 km (88%), with over 50% occurring between 2 and 4 km from coastal or inland water, and only 12% of Ship motifs occurring further than 25 km from coastal or inland water. Because of this more evenly spread distribution when we plot the sites on a scattergram, the R-squared values return a weaker correlation (0.315). Unlike the other site study areas, only 0.89% of Ship motifs occur within 1 km of inland water or the coastline, which is significantly less than the 6% of Circle motifs that occur within this distance. Also unlike the other site study areas, only 1% of Circle motifs are located further than 25 km of inland water or the coastline and over 70% of Circle motifs occur between 2 and 5 km of inland water or the coastline. These distances return a stronger R-squared value (0.606) than the Ship motif. Is this the same for Foot Sole/Foot motifs? The Foot Sole/Foot motif actually behaves more similarly to the Ship than the Circle motif, as 45% of all Foot Sole/Foot motifs are located between 2 and 3 km, and the majority are found up to 10 km from inland water or the coastline. Less than 1% of all Foot Sole/Foot motifs occur within 1 km of inland water or the coastline, and 2% of all Foot Sole/Foot motifs occur further than 25 km from inland water or the coastline. This results in a weaker R-squared value (0.280). Let us now see how these results compare to the other site study areas that experienced shoreline displacement.

North Trøndelag and South Trøndelag: central Norway

The Trøndelag region in central Norway is often described as the region in which the northern and southern traditions of rock art meet. This is clearly seen in the number of panels that contain superimposed imagery from the Stone Age–Iron Age, encompassing motifs from both traditions, such as at Bardal (Sognnes 2008). Though some argue that the terms ‘northern tradition’ and ‘southern tradition’ are divisive and overly generalised categories (see Kaul 2012; Sognnes 2001, 13), there is no doubt that the motifs in the north and in the south are different in their execution, style and chronology. This makes Trøndelag unique (Bradley and

Nimura 2013). The Trøndelag region has been studied extensively, though most of these studies have focused their examinations on individual panels or sites such as Leirfall (Sognnes 2001; 2008; 2011), Bardal (Gjessing 1935; Sognnes 2008; 2010a), Benan (Lindgaard 2006) and Hammer (Bakka 1988). One of the first inclusive regional studies was Gjessing's (1936) extensive monograph of north Scandinavian rock art. Later Sverre Marstrander and Sognnes (1999) updated the catalogue with newly discovered and re-documented sites. Trøndelag's rock art is also examined in Gjerde's (2010a) comprehensive study of northern Fennoscandian rock art. The region has primarily been the purview of Sognnes, whose work spans from the 1980s to the present day, and recently culminated in the most recent study of the Stjørdal municipality in Trøndelag (2001) (see also 1981; 1983a; b; 1987a; b; 1990; 1994; 1995; 1998; 1999a; b; 2002; 2003; 2010a; b; Marstrander and Sognnes 1999; Sognnes and Haug 1998). Sognnes's 2001 publication will be the key source here.

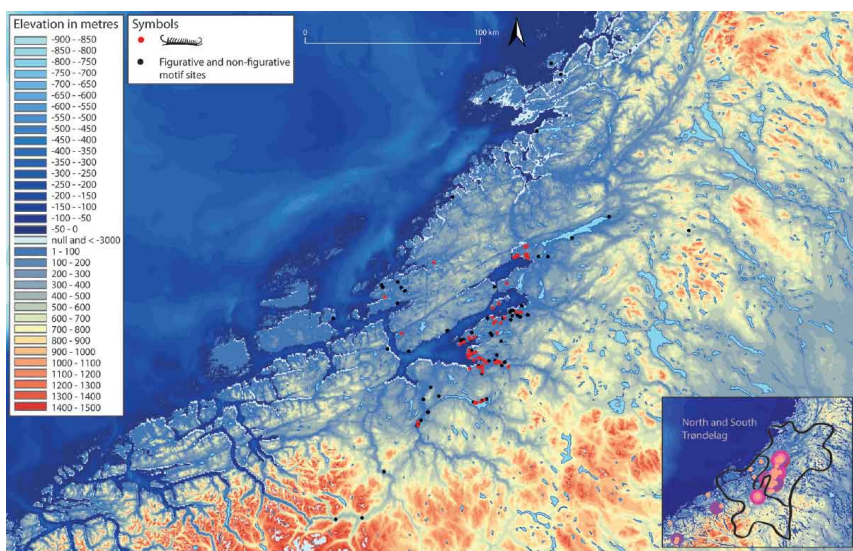


Figure 4.25. Distribution of Ship motif sites (red) and all other rock art sites including Cup Marks (black) in North and South Trøndelag.

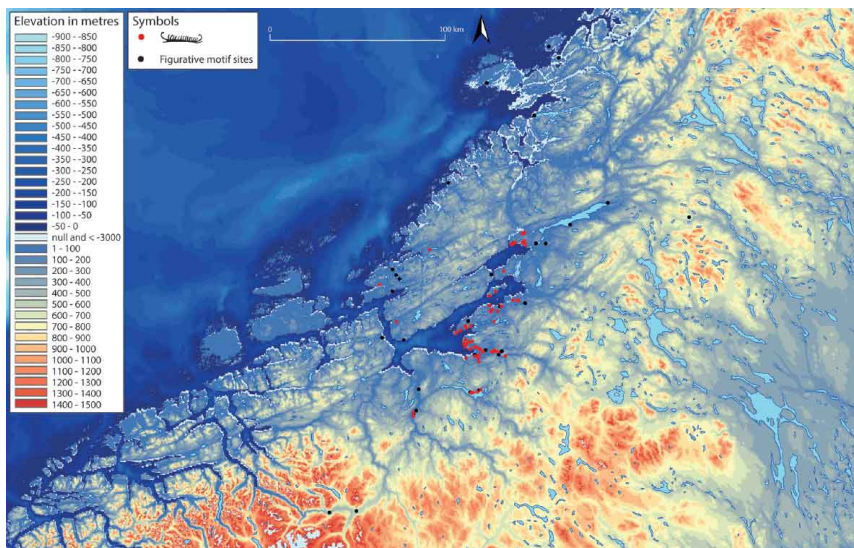


Figure 4.26. Distribution of Ship motif sites (red) and all other figurative motif sites (black) in North and South Trøndelag.

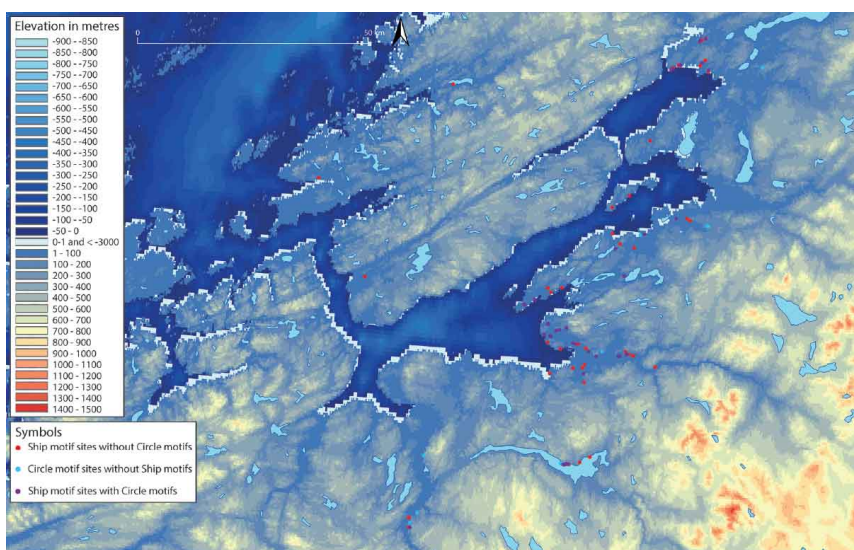


Figure 4.27. Distribution of Ship motif sites with Circle motifs in North and South Trøndelag.

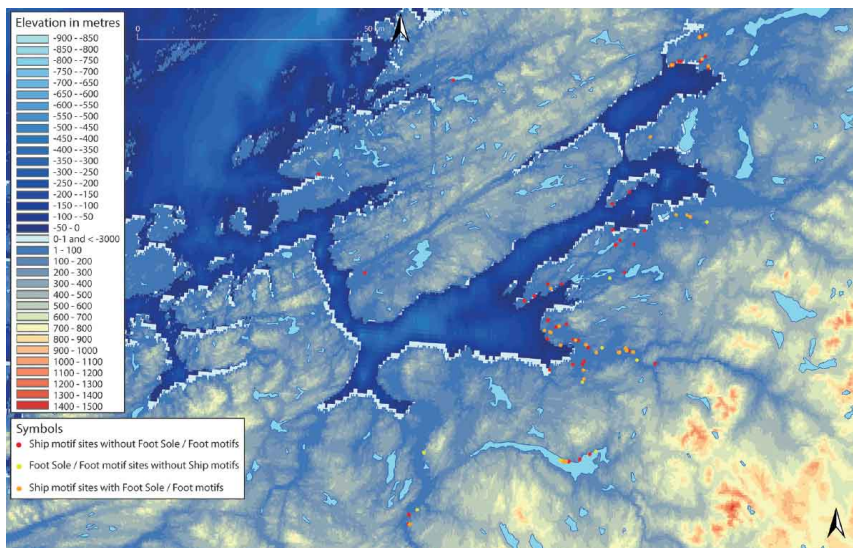


Figure 4.28. Distribution of Ship motif sites with Foot Sole/Foot motifs in North and South Trøndelag.

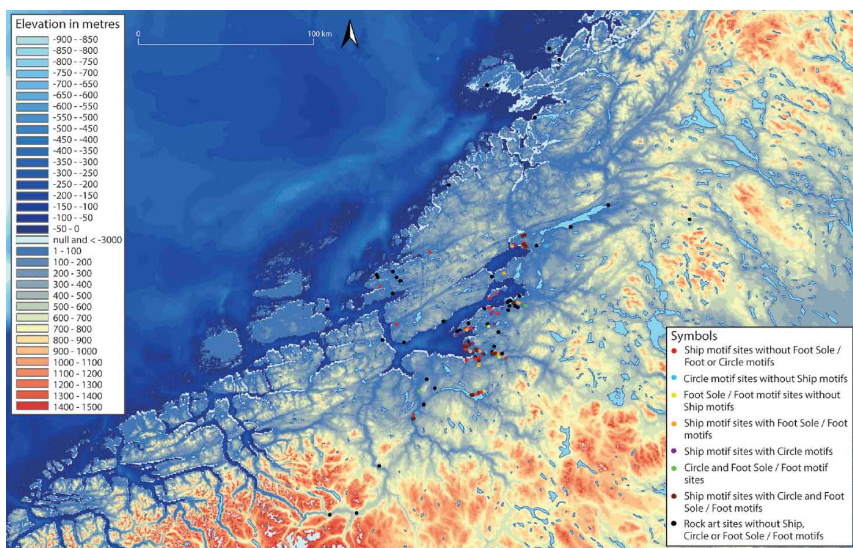


Figure 4.29. Distribution of Ship, Circle and Foot Sole/Foot motif sites with both figurative and non-figurative motif sites in various combinations as they occur on their own or together at rock art sites in North and South Trøndelag.

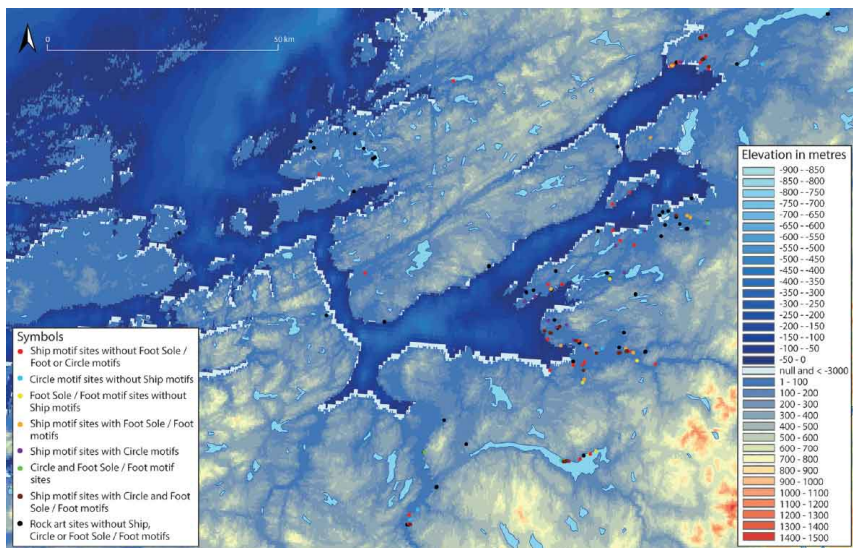


Figure 4.30. Distribution of Ship, Circle and Foot Sole/Foot motif sites with both figurative and non-figurative motif sites in various combinations as they occur on their own or together at rock art sites in North and South Trøndelag (detail).

Environmental change and chronology in North and South Trøndelag

The distribution maps (Fig. 4.25–30) show that the densest concentrations of rock art in the Trøndelag region are clustered around the Trondheim Fjord, and more specifically on the Stjørdal valley (running west to east), and on the Beitstad peninsula in the Steinkjer district in North Trøndelag. As Sognnes (2001, 32) describes, the Stjørdal valley is 70 km long and is penetrated by the Stjørdal River, the Forr tributary and the Gråelva River. The region is also characterised by the Leksa River in the Leksa valley, which runs north to south, then east and parallel with the Stjørdal valley (Sognnes 2001, 33). Sognnes uses two different shoreline displacement curves to create a number of possible sea level scenarios. His results indicate that on average the sea level was 19–22 m higher than present day at the beginning of the Bronze Age, and 12–15 m higher at the end of the Bronze Age (Sognnes 2001, 37–8; see also Kjemperud 1986). This implies that about 7 m of shoreline displacement occurred throughout the Bronze Age (Sognnes 2001, 38). Sognnes's +15 m sea level reconstruction of the Stjørdal area reveals that the rock art around the Stjørdal valley, which was a 'narrow extension of the Stjørdal fjord' in the Bronze Age, would have been primarily bound to the fjord (Sognnes 2001, 37–8; fig. 8). Those low-lying areas would likely have been in close proximity to water in the Bronze Age. Though Sognnes (2001) believes this to be too simplistic a reconstruction, he himself states that it provides a useful *general* picture. Using a similar methodology to that of Ling in Uppland, Sognnes combines shoreline displacement data and heights of rock art locations to determine the maximum date of rock art in the Trøndelag region. He argues that some of these sites are as old as the Middle Mesolithic (Sognnes 2003). The region, however, is dominated by Bronze Age rock art with some Ship imagery likely of Pre-Roman Iron Age date

(Sognnes 2008). The stylistic diversity and quantity of Ship motifs (around 46% of all rock art sites in this region contain a Ship motif) make Trøndelag of particular interest. It is also the region where some of the key panels containing superimposition of motifs are located. Here at sites such as Evenhus and Hammer, Bronze Age motifs are carved on top of Stone Age motifs.

Motif distributions in North and South Trøndelag

The Trøndelag distribution maps do not show the entire Trøndelag region. In fact, the maps show only the region around the Trondheim fjord, as this is where nearly all the rock art is located. The first map shows that many of the rock art sites appear near the coastline and inland water sources (Fig. 4.25). At this smaller-scale the topographic maps clearly demonstrate the point argued by Sognnes: that those rock art sites not presently located directly next to water are, interestingly, situated in low-lying areas and along watercourses. Sea level rise in the Stone Age and shoreline displacement in the Bronze Age would have impacted these areas more significantly, which was exemplified by the palaeogeographic reconstructions in Uppland. Figures 4.25–30 show the same motif distributions that were given for Scandinavia and Uppland. Just as it was observed in Uppland, there is no visually apparent difference in the pattern of motif distribution between the Ship, Circle and Foot Sole/Foot motifs. This pattern may be confirmed or challenged when the actual distances from rock art sites to water are considered.

Table 4.11. North and South Trøndelag: from top to bottom, in order from greatest to least quantity. Column A: the figurative and non-figurative motif name (x motif). Columns B–D: the total amounts of figurative and non-figurative motifs in each county and in North and South Trøndelag combined (x region). Column E: the percentage x motif (Column D) comprises of the total number of motifs in the combined region (7375). Column F: the total number of x motif in Scandinavia. Column G: the percentage the combined region total of x motif (Column D) comprises of the total number of x motif in Scandinavia (Column F). Column H: the percentage the total number of x motif (Column F) comprises of all figurative and non-figurative motifs in Scandinavia (311,483). The grey cells represent the motifs that are originally from F/SE and only occur within that dataset.

A	B	C	D	E	F	G	H
Motif	Total in North Trøndelag	Total in South Trøndelag	Combined region total	% x motif in region comprises of all motifs in region	Total in Scandinavia	% x motif in region comprises of x motifs in Scandinavia	% x motif in Scandinavia comprises of all motifs in Scandinavia
1 Cup Mark	2947	845	3792	51.42%	257,167	1.47%	82.56%
2 Ship	940	56	996	13.51%	19,322	5.15%	6.20%
3 Indefinable	596	88	684	9.27%	8361	8.18%	2.68%
4 Animal	595	37	632	8.57%	4565	13.84%	1.47%
5 Foot Sole/Foot	513	70	583	7.91%	4005	14.56%	1.29%
6 Ring	156	21	177	2.40%	2014	8.79%	0.65%
7 Other Definable	123	12	135	1.83%	1587	8.51%	0.51%
8 Human	118	9	127	1.72%	4649	2.73%	1.49%
9 Cup and Ring	86	24	110	1.49%	412	26.70%	0.13%
10 Oval	13	27	40	0.54%	2315	1.73%	0.74%
11 Sun Cross/Wheel/ Wheel Cross	30	0	30	0.41%	897	3.34%	0.29%
12 Spiral	19	6	25	0.34%	128	19.53%	0.04%
13 Cross	11	3	14	0.19%	87	16.09%	0.03%
14 Frame	12	0	12	0.16%	255	4.71%	0.08%
15 Hand/Arm	4	3	7	0.09%	37	18.92%	0.01%
16 Net	3	2	5	0.07%	30	16.67%	0.01%
17 Weapon	2	2	4	0.05%	511	0.78%	0.16%
18 Plough	2	0	2	0.03%	32	6.25%	0.01%
19 Wheeled Vehicle	0	0	0	0.00%	160	0.00%	0.05%
20 Colour Panel	0	0	0	0.00%	43	0.00%	0.01%
21 Grinding Groove	0	0	0	0.00%	1101	0.00%	0.35%
22 Grinding Surface	0	0	0	0.00%	1182	0.00%	0.38%
23 Groove-shaped Depression	0	0	0	0.00%	2436	0.00%	0.78%
24 Ground Oval Depression	0	0	0	0.00%	15	0.00%	0.00%
25 Tool	0	0	0	0.00%	33	0.00%	0.01%
26 Track Mark	0	0	0	0.00%	76	0.00%	0.02%
27 Tree	0	0	0	0.00%	63	0.00%	0.02%
Totals	6170	1205	7375		311,483		

Motif occurrences in North and South Trøndelag

Many of the patterns that were identified in Scandinavia and in Uppland are repeated in the Trøndelag region. Of the figurative motifs, Ship motifs occur most frequently, though Foot Sole/Foot and Circle motifs are also abundant (Table 4.11). All four types of Circle motifs are represented in Trøndelag, even the traditionally ‘southern’ Sun Cross/Wheel/Wheel Cross motif. Not surprisingly, but interestingly, the second highest occurring motif after the Ship is the Animal. Animal motifs in Trøndelag depict both marine and terrestrial species, including elk and deer, which are common in the ‘northern’ tradition of rock art. Again, this points to the interesting amalgamation of what are typically considered southern and northern motifs, where 996 Ships and 632 Animals exist together in the same region.

Trøndelag is home to around 5% of all Ship motifs in Scandinavia. This is very similar to the concentration in Hordaland and Rogaland (5.69%), but significantly less than that in Østfold, Bohuslän and Uppland (see Table 4.16). Nearly half of all rock art sites in the region contain Ship motifs (46.07%). This is unlike Uppland, where only 13% of sites contain Ship motifs. The majority of rock art sites are located in North Trøndelag (940), not in South Trøndelag (56). There are six sites in the Trøndelag region that contain between 51 and 200 Ships per site, but the majority (65.85%) appear in relatively low concentrations of between one and five

motifs per site. How does this compare to the Circle and Foot Sole/Foot motifs?

There are far fewer Circle motifs than Ship motifs in Trøndelag. However, Trøndelag contains nearly 10% of all Circle motifs in Scandinavia (Table 4.11), and they appear in comparatively higher concentrations per site. Around 11% of Circle motif sites contain between 21 and 50 Circles. In Scandinavia, only 2% of sites contain this concentration of Circle motifs. If we look at Hordaland and Rogaland, which are located further south, about 9% of Circle motif sites contain between 21 and 50 Circles, however four sites contain between 51 and 200 Circles. No sites of that high concentration occur in Trøndelag. Of the four types of Circle motifs the highest occurring is the Ring motif. There are fewer Cup and Ring motifs, though these comprise almost 27% of all Cup and Ring motifs in Scandinavia. Spiral motifs in Trøndelag also occur at a similar frequency, comprising almost 20% of all Spiral motifs in Scandinavia. It has already been mentioned that this is the region where cosmologies revolving around the sun begin to falter. If distributional affiliation between Circle and Ship motifs in rock art could be evidence for such cosmologies, then it is interesting that of the 46 Circle sites in the region, 34 of these also contain a Ship motif (74%).

Foot Sole/Foot motifs, another typically southern motif, are also abundant in this region (Table 4.11). There are 583 recorded Foot Sole/Foot motifs, which comprise nearly 15% of all the Foot Sole/Foot motifs in Scandinavia. This is 12 times more than in the whole of Denmark. This may not seem like a large percentage, but compared to the other site study areas, Trøndelag contains the second highest quantity of this motif (Table 4.16). It is also striking when you consider that the total number of rock art sites in the region comprises only 0.81% of all rock art sites in Scandinavia. Foot Sole/Foot motifs here also appear in groups of higher concentration per site, with four sites containing between 51 and 200 of these iconic motifs.

Motifs and water in North and South Trøndelag

The distance tables for Trøndelag were designed slightly different than those presented for Scandinavia and Uppland (Nimura 2013: tables 6.7–9). Each distance table includes the distance calculations for each province on its own and combined (e.g. North Trøndelag + South Trøndelag = Trøndelag region). These numbers are then compared to Scandinavia as a whole, which gives an idea of the concentration of each motif (Ship, Circle, Foot Sole/Foot) in the site study area. The total number of rock art sites is also given for the region, as this will show the number of rock art sites within certain distance intervals with/without each motif. Displaying the data in this way highlights certain patterns. For example in Trøndelag, whilst there are no Ship motifs beyond 25 km from the coastline, there are seven other rock art sites further than 25 km from the coastline. The results are summarised below.

Across Scandinavia it was observed that the largest percentage of Ship motifs occurred within 1 km of the coast. Though Circle and Foot Sole/Foot motifs displayed a strong connection to water, they were more evenly dispersed amongst the distance intervals. In fact the largest percentage of these two motifs occurred further than 25 km from the coast. If we look at the Trøndelag region, interesting similarities and differences are revealed. In Trøndelag, the largest percentage of

Ship motifs occurs between 1 and 2 km of the coastline (29.92%), though this is only slightly more than the percentage of Ship motifs that is located within 1 km of the coastline (28.21%). Considered together, this means that 58% of all Ship motifs in Trøndelag appear within 2 km of the coastline. There are odd spikes in quantity in the 9–10 (7.13%), 11–12 (7.63%) and 23–24 (3.61%) km distance intervals, much higher than the quantities in those distance intervals in Scandinavia. It is likely that the exclusion of inland water and the use of present-day coastlines in these calculations are affecting this outcome, as was the case in Uppland. This greater disbursement of Ship motifs amongst the distance intervals is reiterated by the R-squared value (0.332), which is less significant than that in Scandinavia (see Fig. 4.12).

Similar patterns are displayed by the Circle motif. In Trøndelag, 23.39% of Circle motifs occur within 1 km of the coastline, as opposed to the 16.5% in Scandinavia. However, the distribution of Circle motifs amongst the distance intervals is more evenly spread. In Trøndelag, as in Scandinavia, the non-Ship motifs display a strong connection to water, but they are still much weaker than that of the Ship. This is an observation reiterated by the weaker R-squared value (0.293; see Fig. 4.13).

The percentage (20.24%) of Foot Sole/Foot motifs that occur within 1 km of water is smaller than that of Circle and Ship motifs. The Foot Sole/Foot motifs' weaker connection to water is also shown by the less significant R-squared value of the Foot Sole/Foot motif (0.235) as compared to the Circle motif (0.293; see Fig. 4.14). Although the Foot Sole/Foot motif displays a weaker connection to water, it is actually stronger in Trøndelag than that displayed in Scandinavia. Let us see now how Østfold and Bohuslän compare.

Østfold and Bohuslän: southeast Norway/western Sweden

The majority of the key publications on the Østfold/Bohuslän region have already been mentioned in this book. Gjessing (1936) produced the first major rock art survey of three Østfold districts and later Marstrander's (1963) survey focused primarily on Skjeberg. The most recent work is a comprehensive catalogue of the rock art of Østfold by Vogt (2012). Studies are plentiful on the rock art of Bohuslän, a region that includes the World Heritage site at Tanum. The stream of publications began with Montelius' 1879 publication of Bohuslän's rock art and publications continue to be produced today (see Bengtsson 2000; Coles 2004; 2005; 2006; Fredsjö *et al.* 1971; 1975; Hygen and Bengtsson 2000; Ling 2004; 2014). In this next section one of the most recent publications on Bohuslän's rock art will be the key source.

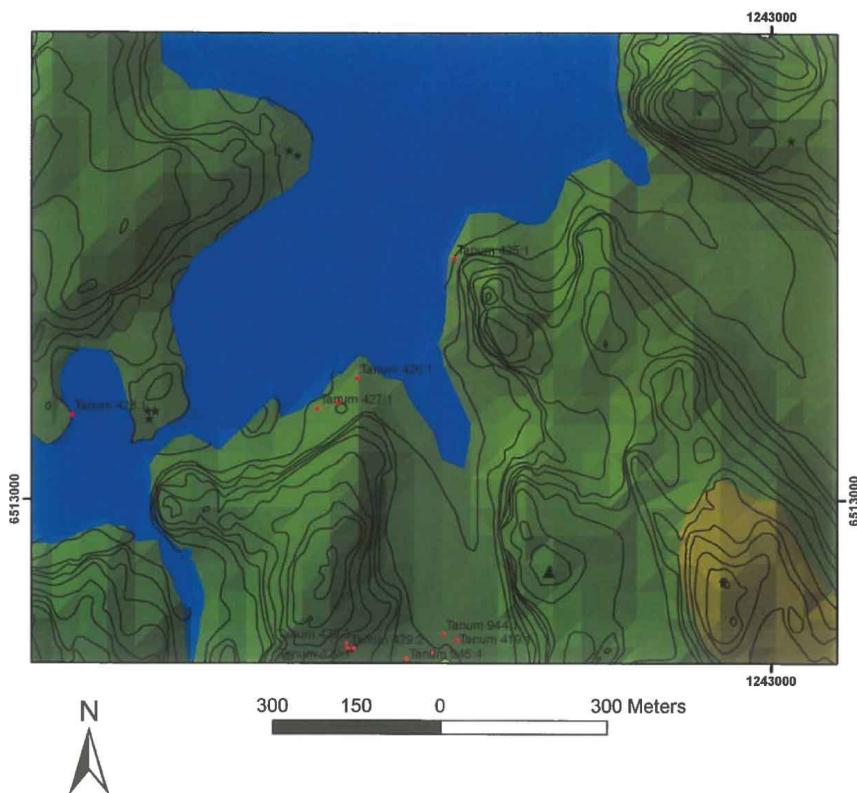


Figure 4.31. 'Reconstruction of the northern parts of the Kalleby area, illustrating the shoreline during the LBA and showing that rock art here was made close to the shore' (Ling 2014, 147: fig. 8.34).

Environmental change and chronology in Østfold and Bohuslän

Because of the lengthy history of research, Østfold and Bohuslän's rock art has experienced many different trends in interpretation, some of which have been affected by the misinterpretation of the prehistoric landscape. Despite the observation by Carl Georg Brunius as early as 1868 that the shorelines might have played a part in choosing which rocks to carve (Coles 2005, 101), for decades the region was believed to have been predominantly arable land in later prehistory (Almgren 1912; Bertilsson 1987). Today we know that this was not the case. For an updated landscape study of the region there is one key source (Ling 2014).

Anne-Sophie Hygen and Bengtsson (2000, 22) previously proposed that the Bronze Age shoreline was c. 15–20 m.a.s.l., and as the highest point in the region is only 325 m.a.s.l., both transgressions and regressions would have had a great effect on the landscape. Coles (2005, 101) was more specific, stating that the northern Bohuslän region 'may have reached about 15–16m relative to the land in c. 1600–1500 BC' and 11–12 m by c. 900–800 BC. In Østfold, sea levels were probably higher, around 20 m.a.s.l. in the Bronze Age (Coles 2005, 101). Coles (2005, 103–16) offers multiple distribution maps of rock art sites with a hypothetical Bronze Age shoreline and shows what Ling, a few years later, would

confirm. The rock art sites were indeed located close to watery locales. In the neighbouring Østfold, Vogt (2012, 40–5) has argued the opposing viewpoint: that by the Late Bronze Age the carvings were not located near the shorelines but were situated on the clay plains that provided good grazing land.

Ling's (2014) *Elevated Rock Art* (originally published in 2008) is a detailed study of the shoreline displacement that occurred in Bronze Age Bohuslän (Tanum and Kville parishes). His work proved that almost 70% of rock art sites in Tanum were located close to bodies of water. The shoreline displacement models are based mainly on new coring data and the geological studies of Tore Pässe (2003; Ling 2014, 52–3). Ling created a more detailed picture of the Bronze Age shoreline by combining existing geological data with dates derived from new cores and re-measured altitudes of the landscape. From the landscape altitude data and the altitudes of rock art sites he was also able to create 2D and 3D models of specific rock art panels with reconstructed shorelines. As we saw in the first case study, the methodologies he employed in Bohuslän were also used in his study of Uppland.

Broadly speaking, in Tanum the shorelines were c. 16–17 m.a.s.l. in the Early Bronze Age and 10–11 m.a.s.l. in the Late Bronze Age (though he states that medieval–present day agricultural activity has likely added another metre to the prehistoric land altitudes) (Ling 2014, 110–11). His results suggest that the shorelines in each period were as follows:

1600 B.C.l. (Ling 2014, 109)

1400 B.C.l. (Ling 2014, 137–39)

1000 B.C.l. (Ling 2014, 122–23)

900 B.C.l. (Ling 2014, 109)

These approximate shoreline altitudes are an average for the Tanum area, but individual sites in the region were analysed in detail. The shoreline displacement data for Østfold and Bohuslän confirm a connection between the figurative rock art sites and water, as Ling's many shoreline reconstructions locate a majority of panels at the Bronze Age shoreline (see Fig. 4.31).

Ling also shows how shoreline displacement is useful for dating the carvings. Reconstructing Bronze Age shorelines allows for maximum dates to be determined, as the location of the water determines which parts of the panel were accessible at different periods in the Bronze Age (see Fig. 1.1). He also compares this shoreline dating methodology to Kaul's (1998) typological dating methodology based on Ship chronology, with positive results. The shoreline dates largely support the typological dates derived from Ships on metalwork, especially regarding Late Bronze Age Ships. Rock art in the Bohuslän region contains Ships of Late Neolithic type, and unlike in Uppland, the tradition in Østfold and Bohuslän continues into the Early Iron Age. In Østfold, Vogt (2012, 71) argues that the majority of sites were carved in the Late Bronze Age, between about 700 and 500 BC, though Early Bronze Age and Pre-Roman Iron Age carvings are also present in the region. There is also great uncertainty about those panels that only contain Cup Marks, which are unable to be dated typologically. Bengtsson (2013) states that the c. 1300 new carvings recorded in Sotenåset and Stångenåset in Bohuslän have greatly increased the number of known Late Bronze Age Period VI and Early Iron Age (500 BC–AD 1) carvings, and also include Ships as late as AD 300.

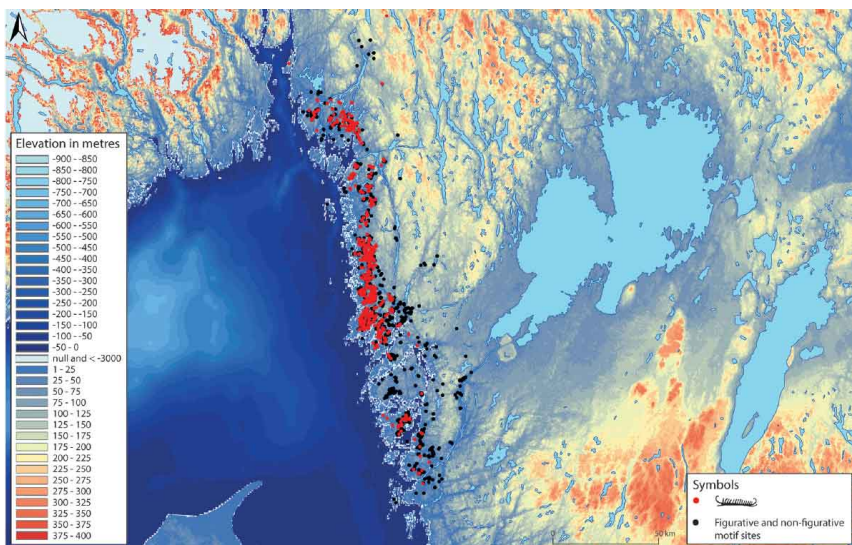


Figure 4.32. Distribution of Ship motif sites (red) and all other rock art sites including Cup Marks (black) in Østfold/Bohuslän.

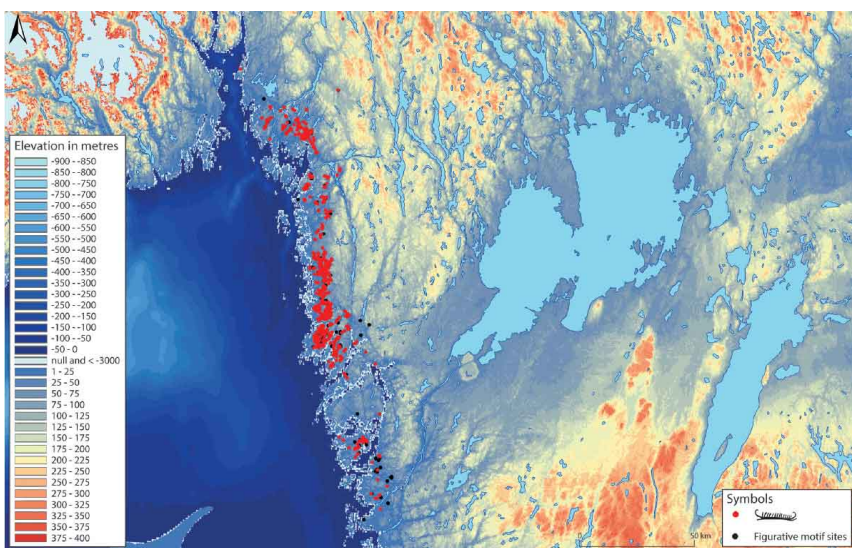


Figure 4.33. Distribution of Ship motif sites (red) and all other figurative motif sites (black) in Østfold/Bohuslän.

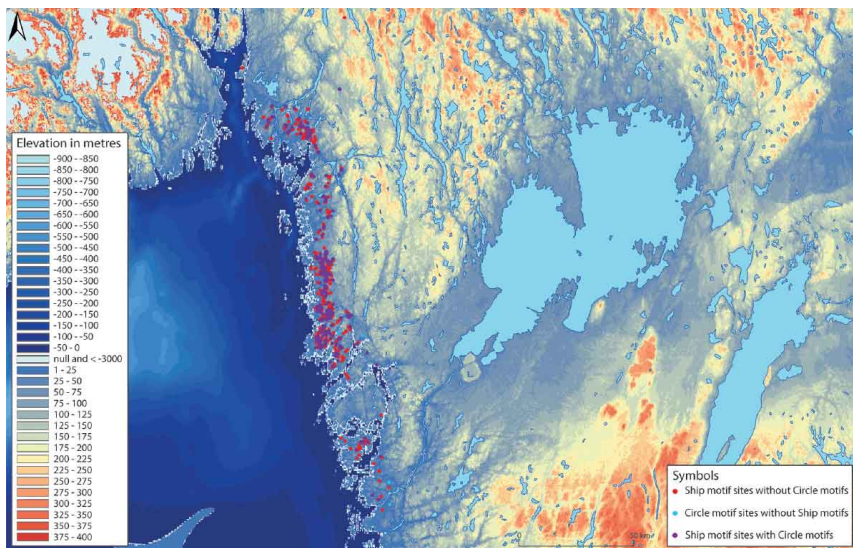


Figure 4.34. Distribution of Ship motif sites with Circle motifs in Østfold/Bohuslän.

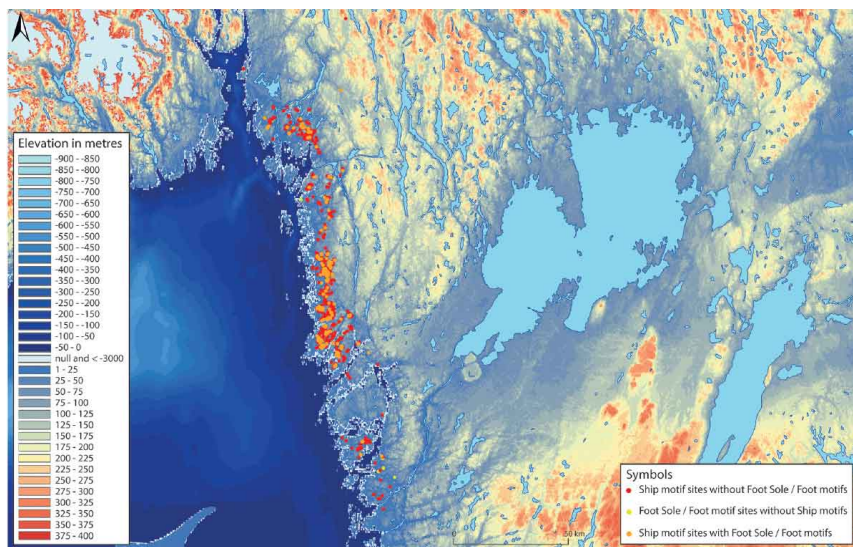


Figure 4.35. Distribution of Ship motif sites with Foot Sole/Foot motifs in Østfold/Bohuslän.

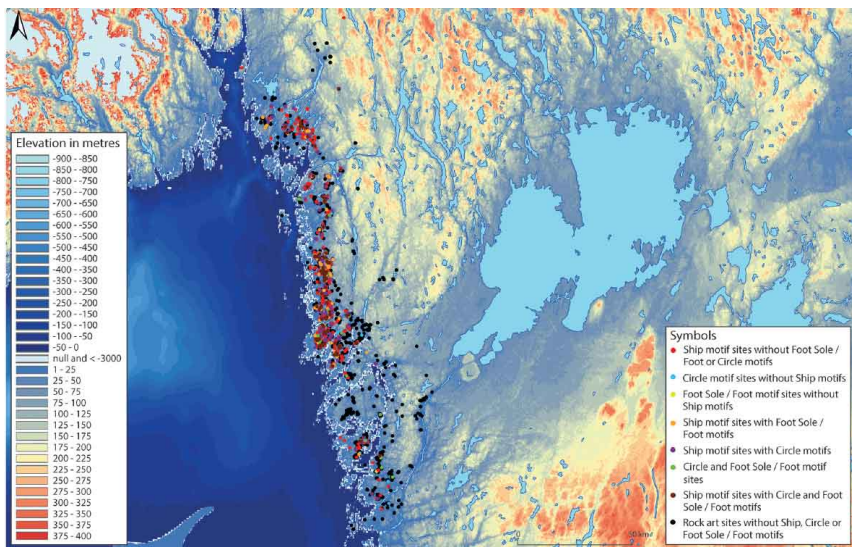


Figure 4.36. Distribution of Ship, Circle and Foot Sole/Foot motif sites with both figurative and non-figurative motif sites in various combinations as they occur on their own or together at rock art sites in Østfold/Bohuslän.

Motif distributions in Østfold and Bohuslän

There is little visual difference amongst the distributions of Ship, Circle and Foot Sole/Foot motifs (Figs 4.34 and 4.35). The only obvious difference is their quantities, for clearly Ship motifs greatly outnumber the other two motifs. It also appears that there are more sites that contain Ships, Circle and Foot Sole/Foot motifs at the same site than, for example, in the Trøndelag or Hordaland and Rogaland regions (Fig. 4.36). In fact, it seems that there are few sites that contain Circle or Foot Sole/Foot motifs without Ships, though this may be attributed to the greater quantity of Ship motifs in Østfold and Bohuslän in general.

It is not surprising to see the Ship motifs clustered so dramatically along the coast, as this has already been established by Ling's detailed work (2014). But there is also a vast amount of other figurative and non-figurative motif sites located in this region, and they also occur further inland. These are mainly non-figurative sites, which is evident when Figure 4.32 is compared to Figure 4.33. As the previous site study areas have shown, those motifs that occur further inland are largely bound to the low-lying areas or are situated on the edges of inland bodies of water and watercourses. The topographic map displays a similar situation to that in Trøndelag and Uppland, so changes to the landscape such as shoreline displacement will likely affect the distance calculations. Though we can see in the distribution maps where ancient watercourses might have flowed, these will not be included in a calculation using a present-day coastline.

Table 4.12. Østfold and Bohuslän: from top to bottom, in order from greatest to least quantity. Column A: the figurative and non-figurative motif name (x motif). Columns B-D: the total amounts of figurative and non-figurative motifs in each county and in Østfold and Bohuslän combined (x region). Column E: the percentage x motif (Column D) comprises of the total number of motifs in the combined region (79,655). Column F: the

total number of x motif in Scandinavia. Column G: the percentage the combined region total of x motif (Column D) comprises of the total number of x motif in Scandinavia (Column F). Column H: the percentage the total number of x motif (Column F) comprises of all figurative and non-figurative motifs in Scandinavia (311,483). The grey cells represent the motifs that are originally from F/SE and only occur within that dataset.

	A Motif	B Total in Østfold	C Total in Bohuslän	D Combined total	E % x motif in region comprises of all motifs in region	F Total in Scandinavia	G % x motif in region comprises of x motifs in Scandinavia	H % x motif in Scandinavia comprises of all motifs in Scandinavia
1	Cup Mark	4552	49,981	54,533	68.46%	257,167	21.21%	82.56%
2	Ship	1196	10,044	11,240	14.11%	19,322	58.17%	6.20%
3	Indefinable	165	3,772	3937	4.94%	8361	47.09%	2.68%
4	Human	248	3,455	3703	4.65%	4649	79.65%	1.49%
5	Animal	114	2,199	2313	2.90%	4565	50.67%	1.47%
6	Foot Sole/Foot	80	732	812	1.02%	4005	20.27%	1.29%
7	Other Definable	79	701	780	0.98%	1587	49.15%	0.51%
8	Ring	75	612	687	0.86%	2014	34.11%	0.65%
9	Sun Cross/Wheel/ Wheel Cross	66	296	362	0.45%	897	40.36%	0.29%
10	Groove-shaped Depression	0	351	351	0.44%	2436	14.41%	0.78%
11	Weapon	22	163	185	0.23%	511	36.20%	0.16%
12	Oval	13	171	184	0.23%	2315	7.95%	0.74%
13	Cup and Ring	20	131	151	0.19%	412	36.65%	0.13%
14	Wheeled Vehicle	21	104	125	0.16%	160	78.13%	0.05%
15	Grinding Surface	0	50	50	0.06%	1182	4.23%	0.38%
16	Spiral	22	26	48	0.06%	128	37.50%	0.04%
17	Track Mark	0	34	34	0.04%	76	44.74%	0.02%
18	Cross	3	29	32	0.04%	87	36.78%	0.03%
19	Tool	6	25	31	0.04%	33	93.94%	0.01%
20	Plough	1	26	27	0.03%	32	84.38%	0.01%
21	Tree	2	20	22	0.03%	63	34.92%	0.02%
22	Frame	0	17	17	0.02%	255	6.67%	0.08%
23	Ground Oval Depression	0	10	10	0.01%	15	66.67%	0.00%
24	Net	6	4	10	0.01%	30	33.33%	0.01%
25	Hand/Arm	7	1	8	0.01%	37	21.62%	0.01%
26	Grinding Groove	0	3	3	0.00%	1101	0.27%	0.35%
27	Colour Panel	0	0	0	0.00%	43	0.00%	0.01%
	Total	6698	72,957	79,655		311,483		

Motif occurrences in Østfold and Bohuslän

Østfold and Bohuslän contain the largest concentration of rock art in Scandinavia. Therefore, the results of motif analyses in this region will not be as easily comparable to the other site study areas. Over 58% of the Ship motifs in Scandinavia are located in this region, as are 20.27% of all Foot Sole/Foot motifs, nearly 37% of all Cup and Ring motifs, 34% of Ring motifs, 38% of Spiral motifs and 40% of all Sun Cross/Wheel/Wheel Cross motifs. Of the figurative motifs, the Ship is the highest occurring, though Circle motifs (when combined) rank 4th and Foot Sole/Foot motifs rank 5th (Table 4.12). There is also an abundance of Human, Animal and Weapon motifs in this region, as well as the majority of Plough and Tool motifs.

We noted in the distribution maps that the Ship motif is visibly most prevalent and in fact 38% of all rock art sites in the region contain a Ship motif. Not only does the Ship motif dominate in sheer quantity, but it also exists in higher concentrations per site. Nearly half of all sites containing between 50 and 200 Ship motifs that occur in Scandinavia are located in Østfold and Bohuslän. Interestingly,

of the four sites in Scandinavia that contain over 200 Ship motifs, none occur in this region.

The Circle motifs combined total 1248. The Ring motif dominates, as was the case in Trøndelag and will be the case in Hordaland and Rogaland. There is also a large concentration of Sun Cross/Wheel/Wheel Cross motifs (362), Cup and Ring (151) and Spiral (48) motifs. Circle motifs occur on 11% of rock art sites in the region, which is less than the 38% that contain Ships. But they occur in weaker densities than in some other site study areas. For example, though 34% of the Ring motifs in Scandinavia occur in this region, nearly 96% of the Ring motif sites have between one and five Ring motifs. The same is true for Cup and Ring, Spiral and Sun Cross/Wheel/Wheel Cross motifs. As in Uppland and Trøndelag, a high percentage (83%) of Circle sites also contain Ship motifs. Of the 486 Circle sites, 405 occur at the same site as Ships. A similar phenomenon is observed with the Foot Sole/Foot motifs. The average number of Foot Sole/Foot motifs per site (3.12) is lower than Trøndelag, Hordaland and Rogaland, Uppland and Denmark and Skåne (see Table 4.18). The majority appear in concentrations between one and five (88%) and occur on only 6% of rock art sites in the region.

Motifs and water in Østfold and Bohuslän

The largest percentage of Ship motifs (17.6%) is located between 1 and 2 km of the coastline, and no Ship motifs occur further than 25 km from the coast. In general, Ship motifs are distributed fairly evenly within the first 8 km of the coastline in Bohuslän and Østfold. This is similar to the pattern in Uppland and Trøndelag. In this region where more detailed shoreline displacement studies have been undertaken, this is hardly surprising. Though Ship motifs are spread more evenly within the first 8 km of the coastline than in Trøndelag or Hordaland and Rogaland, this is most likely attributable to the difference of the present-day landscape from the prehistoric landscape; for we know that in the Bronze Age the region would have been characterised by many bays and inlets. The distribution maps have already shown that rock art is clustered in those low-lying areas that would have been closer to ancient watercourses or at least more susceptible to the effects of environmental change. And interestingly, the R-squared value (0.603) is much more significant than in the other site study areas and comparable to the scenario in Scandinavia. The key point is that Ships become more rare the further they are from the coast.

Circle motifs behave similarly. The greatest quantity of Circle motifs (9.46%) is located between 1 and 2 km from the coastline, and none are located further than 23 km from the coastline. As with the Ship motif, Circle motifs are dispersed more evenly within the first 10 km of the coastline, with only 14 occurring further than 10 km from the coastline. The R-squared value (0.588) is slightly weaker than that of the Ship, though in general the same pattern holds true. Circles also occur less frequently the further they are from the coastline. Even if these inland Circles and Ships might have occurred along watercourses in prehistory, it seems it is the coastline that holds more significance.

The Foot Sole/Foot motif follows patterns similar to those identified with the Circle motif, as was noted in the previous site study areas. The largest percentage (22.04%) of this motif occurs between 1 and 2 km from the coastline, and no Foot

Sole/Foot motifs occur further than 23 km from the coastline (the same as the Circle). Foot Sole/Foot motifs are also distributed more evenly within the first 10 km of the coastline, with only 10 occurring further than 10 km. This pattern is further supported by the R-squared value (0.606), which is as high as that of the Ship. Similarities of motif behaviour amongst the three motifs of interest and the three site study areas have already begun to be established. In Hordaland and Rogaland, we will see if these continue to hold true.

Hordaland and Rogaland: southwest Norway

One of the densest concentrations of rock art in Norway is located in the southwestern counties of Hordaland and Rogaland. The region has therefore been the focus of ample rock art research (Bang-Andersen 1999; Bradley *et al.* 2002; Fett and Fett 1941; Mandt 1972; Nordenborg Myhre 2004; Wrigglesworth 2011). The longstanding tradition of rock art research in these two counties began with a comprehensive survey and gazetteer of rock art in Rogaland published by Per and Eva Fett in 1941. Gro Mandt's 1972 survey was one of the first extensive analyses of the rock art in Hordaland. The districts of Hardanger and Sunnhordland in Hordaland county have recently been studied by Wrigglesworth (2011). This study will be the key source discussed below.

Environmental change and chronology in Hordaland and Rogaland

Prøsch-Danielsen (2006) provides a detailed report of Mesolithic sea level changes in Rogaland (see also Hafsten 1983; Kaland 1984), but there are few Stone Age rock art sites in the region, and this book is more focused on the Bronze Age. Unfortunately shoreline displacement data are less detailed for Hordaland and Rogaland in the Bronze Age, though recent studies are changing this (Romundset 2005; Vasskog 2006 as cited by Wrigglesworth 2011). Wrigglesworth (2011) claims that shoreline displacement in her study area would have been minimal due to the lack of isostatic rebound, so 'most monuments are likely to be found in their original topographic context in terms of location in relation to the contemporary shoreline' (Wrigglesworth 2011, 59; see also Ling 2014; Sognnes 2003). Without taking into account tidal ranges, from the beginning of the Bronze Age at c. 12 m.a.s.l. to the end of the Bronze Age, only a couple of metres of sea level change occurred (Wrigglesworth 2011, 60). The previous site study areas have pointed out that shoreline displacement would have affected low-lying areas, and been more visible in coastal areas with shallower bathymetric gradations. In Hordaland, these areas would have been 'the innermost ends of the fjords, where the shoreline would have been significantly higher ... and relatively flat areas ... would have been shallow bays in the Bronze Age' (Wrigglesworth 2011). Wrigglesworth (2011, 206, 208) observes that the figurative rock art is primarily found in the intertidal zones, an observation which is supported by the distance analyses that follow. In other regions in Sweden, Goldhahn and Ling (2013, 282–3) claimed that areas containing complex rock art sites were set apart from settlement areas. This is a pattern also observed in Sogn and Fjordane county just north of Hordaland, where Mandt (1993) claimed that settlement sites were located inland, whilst rock art sites occupied the coastal zone. In Rogaland, rock art is clustered around the

Bokna fjord. Unfortunately Nordenborg Myhre's (2004) recent study does not include any shoreline displacement data. She does state that most rock art sites in Rogaland are 'situated within a coastal zone less than .5 km from the present shoreline' and are placed on 'striated rocks that face water and are observable from the shore or from boats' (Nordenborg Myhre 2004, 224).

In Hordaland, Ships are dated as early as the Late Neolithic, but the majority are Bronze Age carvings with a few created in the Pre-Roman Iron Age (Wrigglesworth 2011, 110–23). In Rogaland, Ship motifs date primarily to the Bronze Age period I–IV, with the majority dated to periods III–IV (Nordenborg Myhre 2004, 225). From published sources we know that there is a lack of Pre-Roman Iron Age Ships in the region in comparison to other rock art-rich regions such as Østfold, Bohuslän and Trøndelag. Is it possible that this shorter chronology is tied to the lack of environmental change in the area?

Motif distributions in Hordaland and Rogaland

Hordaland and Rogaland experienced minimal shoreline displacement. This is a key difference from the three regions previously presented, and largely explains why Ships in Hordaland and Rogaland appear to be located closer to the coastline in the distribution maps and distance calculations. In the previous site studies, it was identified that figurative motif sites often occurred in low-lying areas, which would have been close to the shoreline in prehistory. This pattern is echoed in Hordaland and Rogaland, although here, where there was minimal shoreline displacement, the figurative rock art sites remain close to water today. Non-figurative sites, however, also occur further inland and at higher elevations spreading over a larger geographical area (Fig. 4.37). Wrigglesworth (2011, 68) asserted that Cup Mark sites in this region are clustered around 200–400 m.a.s.l. and 500–900 m.a.s.l., and are associated with good grazing pastures. In Hordaland and Rogaland, there seems to be a stronger distributional difference between non-figurative sites and figurative sites, but little apparent distributional difference amongst Ship, Circle and Foot Sole/Foot motifs (Figs 4.37 and 4.41). What is particularly curious is that there is a lack of sites that contain Ships and Circle and Foot Sole/Foot motifs at the same site, as their distributions are so similar. Instead, they seem to remain oddly divided site by site.

Motif occurrences in Hordaland and Rogaland

The patterns of motif occurrences are broadly similar to the previous site study areas, though there are a few key differences. Ship motifs, of which there are 1099, are the highest occurring figurative motif in the region (Table 4.13). The 2nd highest occurring is the Circle motif and the 3rd highest occurring is the Foot Sole/Foot motif. This differs from the Trøndelag region slightly, which contains significantly more Foot Sole/Foot motifs (583) than in Hordaland and Rogaland (188). This is interesting because Hordaland and Rogaland are located further south than Trøndelag, and the Foot Sole/Foot is generally regarded as a southern Scandinavian motif. Unlike in the previous site study areas, Animals occur less frequently; only 33 are noted in Hordaland and Rogaland. Other figures that characterise the region are the enigmatic Frame and Net motifs. Fett and Fett's (1941) monograph of the rock art of this region depicts many of these motifs. The

Nets in Hordaland and Rogaland comprise approximately 23% of all the Net motifs in Scandinavia, second only to the Østfold and Bohuslän region. This is striking when you consider that the rock art of Østfold and Bohuslän comprise 20% of all rock art in Scandinavia, whereas Hordaland and Rogaland comprise less than 1% of the Scandinavian total. The Frame motif is also prevalent (Fig. 4.42): 11% of all the Frame motifs in Scandinavia are in Hordaland and Rogaland, the highest concentration in the five site study areas.

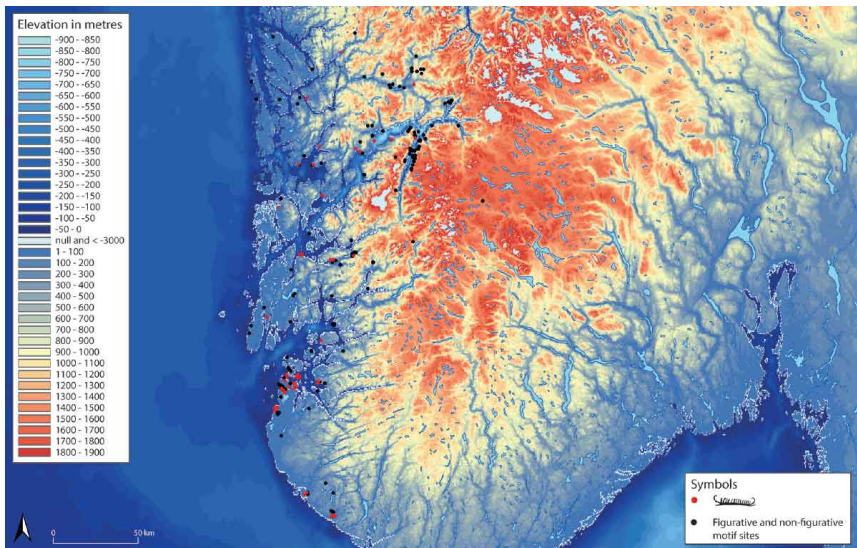


Figure 4.37. Distribution of Ship motif sites (red) and all other rock art sites including Cup Marks (black) in Hordaland/Rogaland.

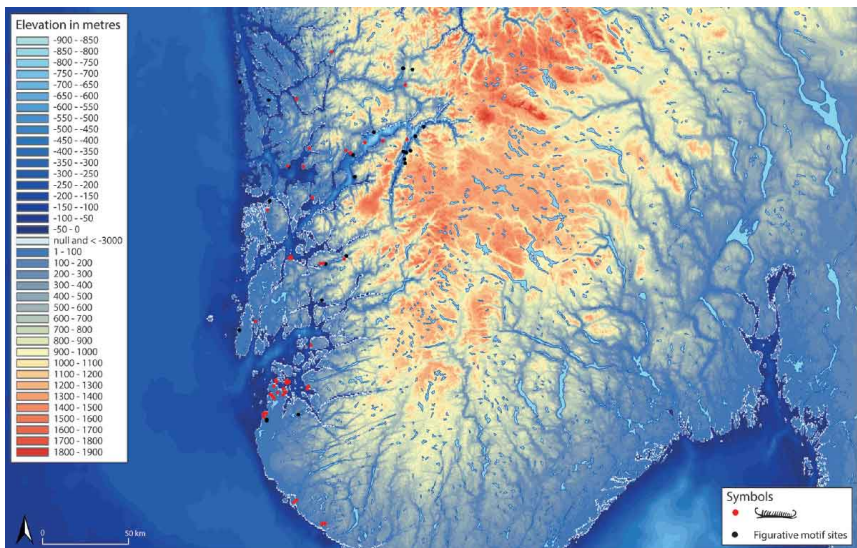


Figure 4.38. Distribution of Ship motif sites (red) and all other figurative motif sites (black) in Hordaland/Rogaland.

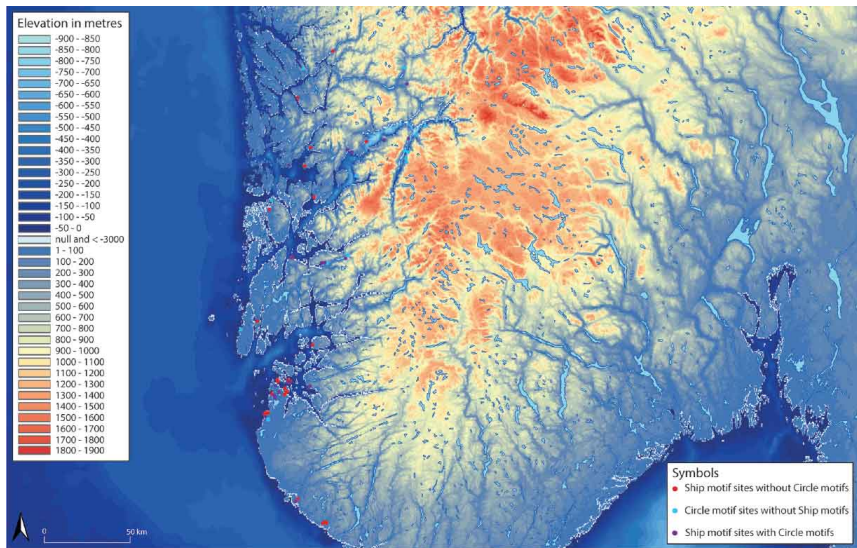


Figure 4.39. Distribution of Ship motif sites with Circle motifs in Hordaland/Rogaland.

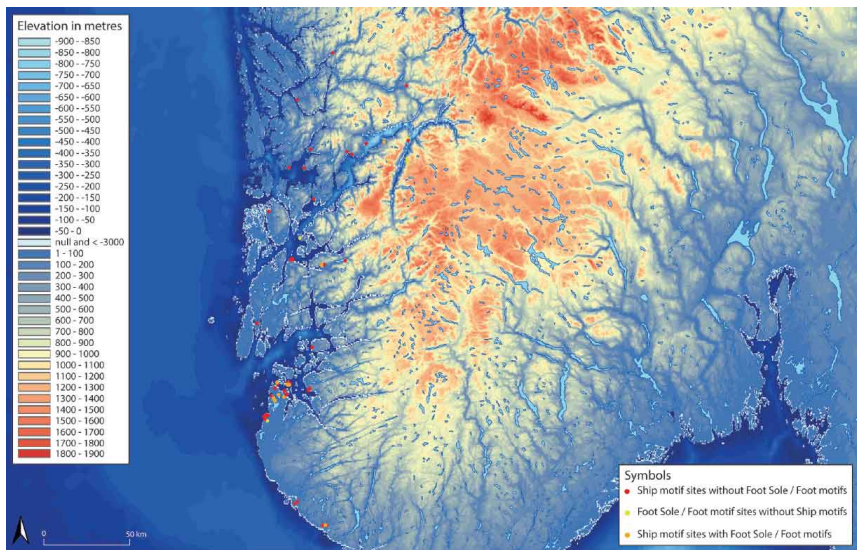


Figure 4.40. Distribution of Ship motifs with Foot Sole/Foot motifs in Hordaland/Rogaland.

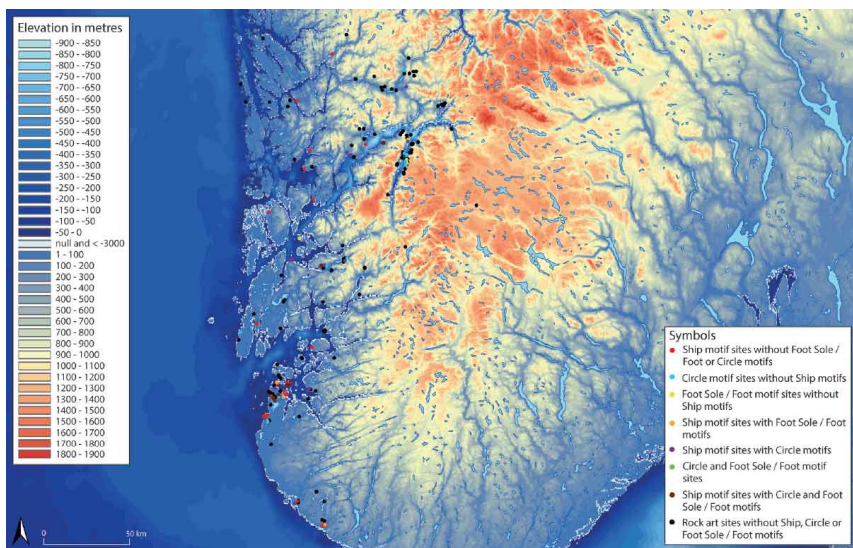


Figure 4.41. Distribution of Ship, Circle and Foot Sole/Foot motif sites with both figurative and non-figurative motif sites in various combinations as they occur on their own or together at rock art sites in Hordaland/Rogaland.



Figure 4.42. Two examples of the Frame motif. A) A single frame from the panel at Åmøy II (after Fett & Fett 1941, 45-6: pl. 13, fig. 29). B) Two joined motifs from the panel at Åmøy Panel I: the vertical motif is categorised as a possible Frame (or Ship), and the horizontal motif is a Ship (after Fett & Fett 1941, 35: pl. 9C, fig. 7-8).

Ship motifs' quantity and concentration per site are comparable to that of Trøndelag. There are 1099 Ship motifs in Hordaland and Rogaland, and 996 in Trøndelag. These figures are significantly lower than in Østfold and Bohuslän, which contain nearly 60% of all Ship motifs in Scandinavia. But they are significantly higher than in Denmark and Skåne, which contain less than 2% of all Ship motifs in Scandinavia (Table 4.16). The majority of Ship motif sites contain between one and five Ship motifs (52.38%), though five sites contain between 51 and 200 Ship motifs. A single site, one of the four in Scandinavia, contains over 200 Ships. No Circle or Foot Sole/Foot sites occur at such a high site concentration in the region.

Table 4.13. Hordaland and Rogaland: from top to bottom, in order from greatest to least quantity. Column A: the figurative and non-figurative motif name (x motif). Columns B–D: the total amounts of figurative and non-figurative motifs in each county and in Hordaland and Rogaland combined (x region). Column E: the percentage x motif (Column D) comprises of the total number of motifs in the combined region (5880). Column F: the total number of x motif in Scandinavia. Column G: the percentage the combined region total of x motif (Column D) comprises of the total number of x motif in Scandinavia (Column F). Column H: the percentage the total number of x motif (Column F) comprises of all figurative and non-figurative motifs in Scandinavia (311,483). The light grey cells represent the motifs that are originally from F/SE and only occur within that dataset.

	A Motif	B Total in Hordaland	C Total in Rogaland	D Combined total	E % x motif in region comprises of all motifs in region	F Total in Scandinavia	G % x motif in region comprises of x motifs in Scandinavia	H % x motif in Scandinavia comprises of all motifs in Scandinavia
1	Cup Mark	2410	1246	3656	62.18%	257,167	1.42%	82.56%
2	Ship	223	876	1099	18.69%	19,322	5.69%	6.20%
3	Ring	157	105	262	4.46%	2014	13.01%	0.65%
4	Indefinable	73	156	229	3.89%	8361	2.74%	2.68%
5	Other Definable	32	158	190	3.23%	1587	11.97%	0.51%
6	Foot Sole/Foot	93	95	188	3.20%	4005	4.69%	1.29%
7	Human	70	14	84	1.43%	4649	1.81%	1.49%
8	Animal	16	17	33	0.56%	4565	0.72%	1.47%
9	Sun/Cross/Wheel/ Wheel Cross	15	17	32	0.54%	897	3.57%	0.29%
10	Frame	0	28	28	0.48%	255	10.98%	0.08%
11	Oval	13	8	21	0.36%	2315	0.91%	0.74%
12	Cup and Ring	4	11	15	0.26%	412	3.64%	0.13%
13	Cross	9	2	11	0.19%	87	12.64%	0.03%
14	Spiral	8	1	9	0.15%	128	7.03%	0.04%
15	Tree	7	1	8	0.14%	63	12.70%	0.02%
16	Net	0	7	7	0.12%	30	23.33%	0.01%
17	Weapon	0	5	5	0.09%	511	0.98%	0.16%
18	Hand/Arm	0	3	3	0.05%	37	8.11%	0.01%
19	Grinding Groove	0	0	0	0.00%	1101	0.00%	0.35%
20	Groove-shaped Depression	0	0	0	0.00%	2436	0.00%	0.78%
21	Wheeled Vehicle	0	0	0	0.00%	160	0.00%	0.05%
22	Grinding Surface	0	0	0	0.00%	1182	0.00%	0.38%
23	Track Mark	0	0	0	0.00%	76	0.00%	0.02%
24	Plough	0	0	0	0.00%	32	0.00%	0.01%
25	Ground Oval Depression	0	0	0	0.00%	15	0.00%	0.00%
26	Colour Panel	0	0	0	0.00%	43	0.00%	0.01%
27	Tool	0	0	0	0.00%	33	0.00%	0.01%
	Total	3130	2750	5880		311,483		

There are other similarities and differences between the two Norwegian site study areas regarding Circle motifs. Their quantities of Circles are similar: 318 in Hordaland and Rogaland and 342 in Trøndelag. And the concentrations of Circle motifs per site are equally low. In Hordaland and Rogaland, 71% of sites contain one to five Circle motifs and in Trøndelag, this percentage is 70%. In Hordaland and Rogaland, however, there are four sites that contain between 51 and 200 Circle motifs. No Circle sites contain such a high quantity of Circle motifs in Trøndelag. Ring motifs are the most dominate type of Circle motif, whereas Sun Cross/Wheel/Wheel Cross, Cup and Ring and Spiral motifs are minimal. The Ring motifs in Hordaland and Rogaland comprise approximately 13% of all Ring motifs in Scandinavia, which is the 2nd highest percentage of all five site study areas (Table 4.15a–b). It is interesting that a nearly equal number of Sun Cross/Wheel/Wheel Cross motifs are located in Hordaland and Rogaland as in Trøndelag; for

Trøndelag is located much further north, and the Sun Cross/Wheel/Wheel Cross is traditionally considered a southern motif. Considering the distribution patterns of Ships and Circles, of the 46 Circle sites in Hordaland and Rogaland, only 28 contain both Ships and Circles. This is a much lower percentage (61%) than in Østfold, Bohuslän, Uppland and Trøndelag.

There are only 188 Foot Sole/Foot motifs in Hordaland and Rogaland, significantly less than the 583 in the Trøndelag region. This highlights again the same odd pattern that was observed with the quantities of Sun Cross/Wheel/Wheel Cross motifs, for the Foot Sole/Foot motif is generally associated with the southern tradition of rock art, yet the quantity of this motif is significantly higher in the more northern county of Trøndelag. The Foot Sole/Foot motifs in Hordaland and Rogaland comprise barely 5% of the total number of this motif in Scandinavia, the smallest concentration of the five site study areas. Let us now see how the motif's distances to water compare.

Motifs and water in Hordaland and Rogaland

The calculations of distances to the present-day coastline are affected by the lack of postglacial shoreline displacement in this region. The results show an astounding connection of Ship motifs to water: almost 90% of Ship sites in the region occur within 1 km of the coastline. Only 28.21% of Ship sites in Trøndelag, 8.45% in Østfold and Bohuslän, and 16.46% in Scandinavia occur within 1 km of the coastline. The clustering of Ships within 1 km, and the lack of Ships further than 17–18 km from the coastline, make the R-squared value very weak (0.137).

Far fewer, though still a significant quantity of, Circle motifs (58%) are located within 1 km of the coastline. And although less than 6% of Circles occur further than 25 km from the coastline, the Circle is more dispersed between the distance intervals. To make a relative comparison, the pattern remains the same as in the other site study areas. The Circle motifs, though coastally bound, are not a solely coastal phenomenon. Foot Sole/Foot motifs behave similarly to the Circle motifs, with around 53% occurring within 1 km of the coastline. However, unlike the Circle, all but six Foot Sole/Foot motifs appear within 3 km of the coastline. In this way Foot Sole/Foot motifs actually appear to have a stronger tie to the coastline. These results can be analysed in tandem with patterns observed in the distribution maps. Ship, Circle and Foot Sole/Foot motifs are all clustered around the coastline, but do not exist on the same sites as often as they do in Trøndelag. This perhaps implies that the Foot Sole/Foot and Circle motifs in this region held a different symbolic meaning than in the Trøndelag region.

Denmark and Skåne (detail of Simris): southern Scandinavia

In southern Scandinavia, emphasis is placed on the Simris area of Skåne, as it has been the focus of numerous rock art studies (see Althin 1945; Bertilsson 2013; Bradley 2000; Kaul 1997; Söderberg and Hellerström 2003; Welinder 1974). Göran Burenhult (1973; 1980) conducted the first systematic surveys of rock art in Skåne, which Sven-Gunnar Broström and Kenneth Ihrestam (1996; 2011) have recently updated. Coles (1999), who worked extensively in Bohuslän and Uppland, has also published on this region. The most current work has been undertaken by Skoglund

(2005; 2009; 2013a; b; 2015) who has been leading a research project in southeast Skåne.

Table 4.14. Denmark and Skåne: from top to bottom, in order from greatest to least quantity. Column A: the figurative and non-figurative motif name (x motif). Columns B–D: the total amounts of figurative and non-figurative motifs in each region and in Denmark and Skåne combined (x region). Column E: the percentage x motif (Column D) comprises of the total number of motifs in the combined region (30,679). Column F: the total number of x motif in Scandinavia. Column G: the percentage the combined region total of x motif (Column D) comprises of the total number of x motif in Scandinavia (Column F). Column H: the percentage the total number of x motif (Column F) comprises of all figurative and non-figurative motifs in Scandinavia (311,483). The grey cells represent the motifs that are originally from F/SE and only occur within that dataset.

A	B	C	D	E	F	G	H
Motif	Total in Skåne	Total in Denmark	Total in southern Scandinavia	% x motif in region comprises of all motifs in region	Total in Scandinavia	% x motif in region comprises of x motifs in Scandinavia	% x motif in Scandinavia comprises of all motifs in Scandinavia
1 Cup Mark	22,661	4444	27,105	88.35%	257,167	10.54%	82.56%
2 Indefinable	488	134	622	2.03%	8361	7.44%	2.68%
3 Grinding Groove	608	0	608	1.98%	1101	55.22%	0.35%
4 Oval	480	57	537	1.75%	2315	23.20%	0.74%
5 Groove-shaped Depression	469	0	469	1.53%	2436	19.25%	0.78%
6 Foot Sole/Foot	400	47	447	1.46%	4005	11.16%	1.29%
7 Ship	178	120	298	0.97%	19,322	1.54%	6.20%
8 Sun Cross/Wheel/ Wheel Cross	59	99	158	0.52%	897	17.61%	0.29%
9 Ring	32	83	115	0.37%	2014	5.71%	0.65%
10 Weapon	106	0	106	0.35%	511	20.74%	0.16%
11 Other Definable	17	47	64	0.21%	1587	4.03%	0.51%
12 Animal	27	6	33	0.11%	4565	0.72%	1.47%
13 Human	21	10	31	0.10%	4649	0.67%	1.49%
14 Wheeled Vehicle	22	2	24	0.08%	160	15.00%	0.05%
15 Hand/Arm	1	18	19	0.06%	37	51.35%	0.01%
16 Grinding Surface	12	0	12	0.04%	1,182	1.02%	0.38%
17 Cross	1	6	7	0.02%	87	8.05%	0.03%
18 Cup and Ring	3	4	7	0.02%	412	1.70%	0.13%
19 Spiral	4	3	7	0.02%	128	5.47%	0.04%
20 Frame	4	0	4	0.01%	255	1.57%	0.08%
21 Track Mark	3	0	3	0.01%	76	3.95%	0.02%
22 Plough	0	2	2	0.01%	32	6.25%	0.01%
23 Ground Oval Depression	1	0	1	0.00%	15	6.67%	0.00%
24 Colour Panel	0	0	0	0.00%	43	0.00%	0.01%
25 Net	0	0	0	0.00%	30	0.00%	0.01%
26 Tool	0	0	0	0.00%	33	0.00%	0.01%
27 Tree	0	0	0	0.00%	63	0.00%	0.02%
Total	25,597	5082	30,679		311,483		

Environmental change and chronology in Denmark and Skåne

Denmark experienced far less shoreline displacement in the Bronze Age than its Scandinavian neighbours, for the centre of the Fennoscandian glacier was much further to the north and east. Coastlines were inundated because of rising sea levels in the Mesolithic. After this period the northern half of Denmark experienced isostatic rebound, though the majority took place before the Bronze Age. The southern half of Denmark saw relatively little change. In Skåne, the situation was similar. Most of the detailed environmental information for this region can be sourced from the Ystad project results, though this focused primarily

on the southwest part of Sweden. Environmental data in southeast Skåne is less detailed, but the isostatic curves for southern Sweden provide evidence of minimal land uplift. Coles (1999, 167) states that 'the shape of the land today is considered to be more or less that of the Bronze Age, unlike areas farther north and west which have dramatically different geographic regimes from those of the past'. The shoreline around Simrishamn, southeast Skåne, was at most about 2 m higher than in the Early Bronze Age (Skoglund 2015). Ling (2008, 43) states that the '... altitude of rock art ranges in general from about 7–15 m.a.s.l. (Burenhult 1980; Skoglund 2005)', which is pertinent if the Early Bronze Age sea level was about 2–3 m higher than today and about 1 m.a.s.l. by the end of the Bronze Age (Gedda 2007). If this is the case, it is possible to claim that in the Simris region, rock art sites would have been about 3–7 m higher than the Bronze Age shoreline (Ling 2008, 44).

The chronology of the rock art in Denmark and Skåne is obviously varied throughout this extensive geographic area. In Denmark, the creation of rock art extends from as early as the Late Mesolithic into the Pre-Roman Iron Age. However, as with the rest of Scandinavia, the majority of rock art was created during the Bronze Age. If we turn our attention back to the southeast of Skåne, we find the majority of Ship carvings in southern Scandinavia. It is here that detailed work is being undertaken to propose a new chronology for the rock art on the iconic panels at Järrestad and Simris. Ships and Axes dominate the larger coastal sites around Simrishamn, and the majority of these are dated to the Early Bronze Age (see Fig. 3.3). The further inland Järrestad site is dominated by Foot/Foot Soles. Coles (1999) argued that the majority of Ships on the Järrestad panel could be dated to the Late Bronze Age Period V, VI or to the earliest Pre-Roman Iron Age (see also Skoglund 2015). Skoglund (2013a; b) has more recently analysed the Järrestad panel, and argues that the chronology of the Ships extends from around 1700 BC to around 200 BC. The majority were created in the later part of the Bronze Age and Pre-Roman Iron Age. The depictions of feet on this panel fall into two main categories: those that are depicted in outline, and those that depict toes and are fully carved out. Based on comparative analysis with other sites and artefacts, Skoglund argues that the fully carved feet with toes were created in the Early Bronze Age, and the outlined feet were created in the Late Bronze Age. He points out that there is a clear distinction between the Early and Late Bronze Age carvings on this panel. The distinction between motif types marks a point at which other regional changes in settlements and land use occurred. Perhaps alterations to rock art motifs could be evidence of the influence of the emerging Hallstatt C1 culture, which corresponds to the Bronze Age Period VI (2013a, 695–98, Skoglund 2015).

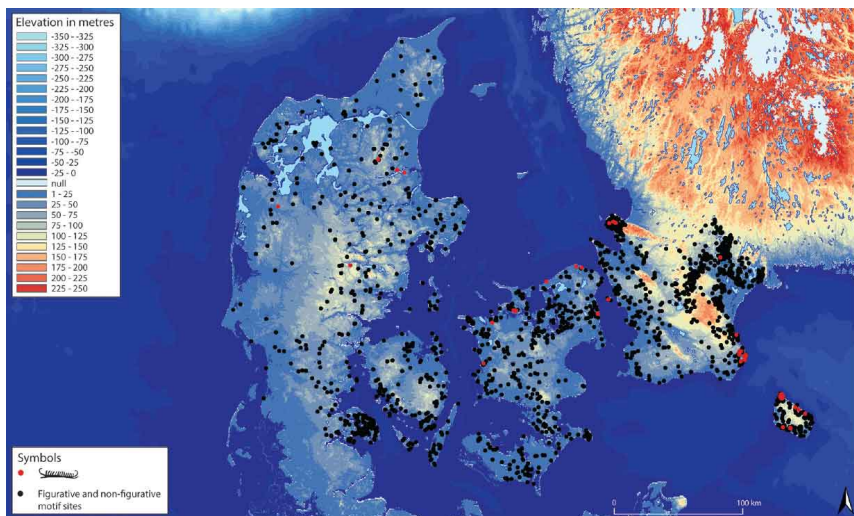


Figure 4.43. Distribution of Ship motif sites (red) and all other rock art sites including Cup Marks (black) in Denmark and Skåne.

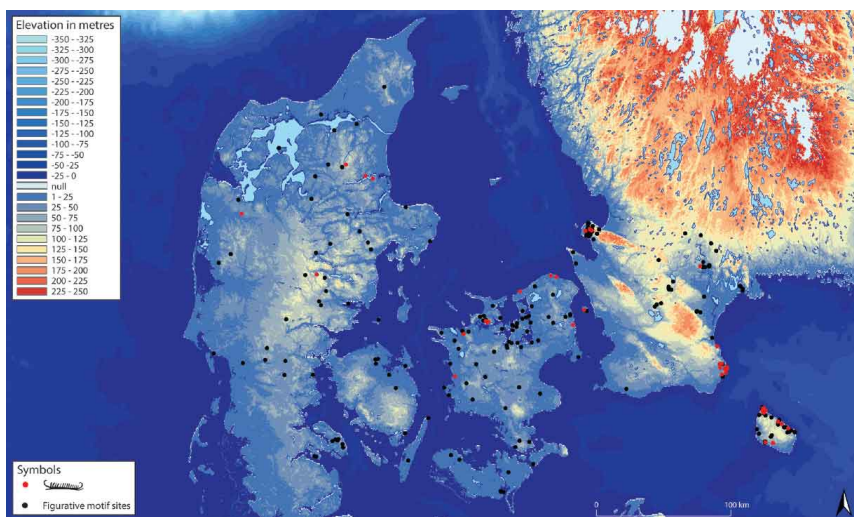


Figure 4.44. Distribution of Ship motif sites (red) and all other figurative motif sites (black) in Denmark and Skåne.

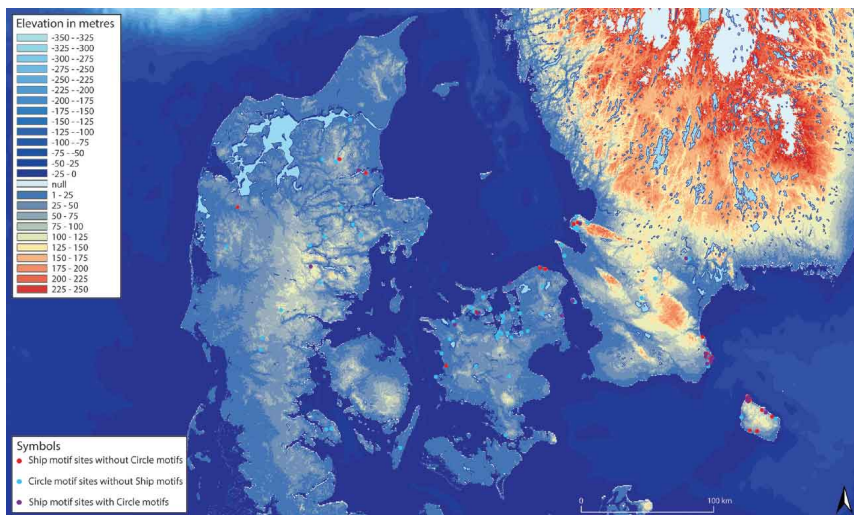


Figure 4.45. Distribution of Ship motif sites with Circle motifs in Denmark and Skåne.

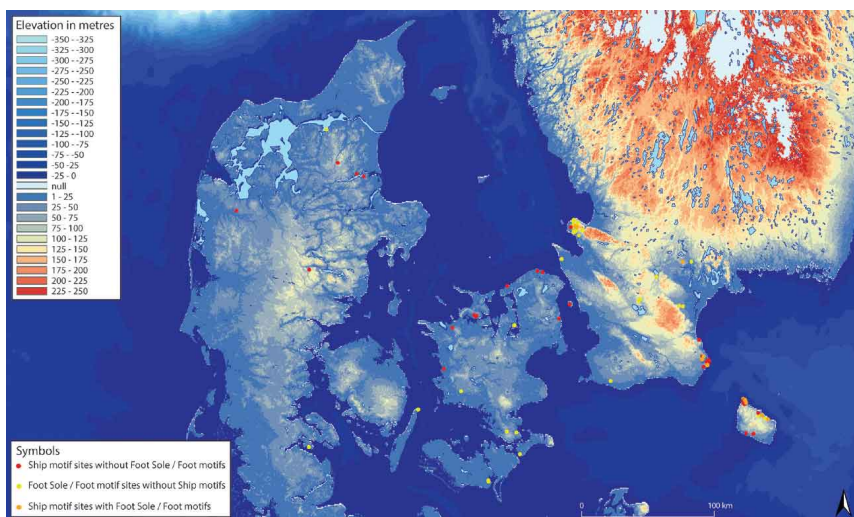


Figure 4.46. Distribution of Ship motif sites with Foot Sole/Foot motifs in Denmark and Skåne.

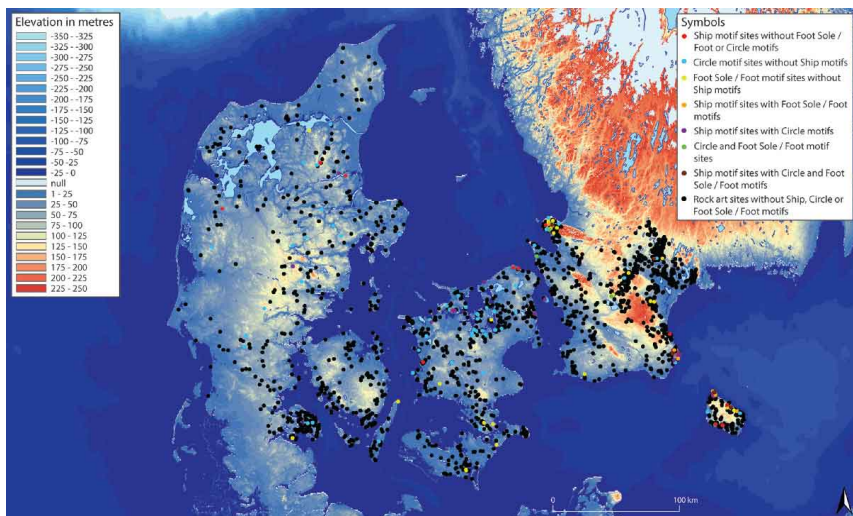


Figure 4.47. Distribution of Ship, Circle and Foot Sole/Foot motif sites with both figurative and non-figurative motif sites in various combinations as they occur on their own or together at rock art sites in Denmark and Skåne.

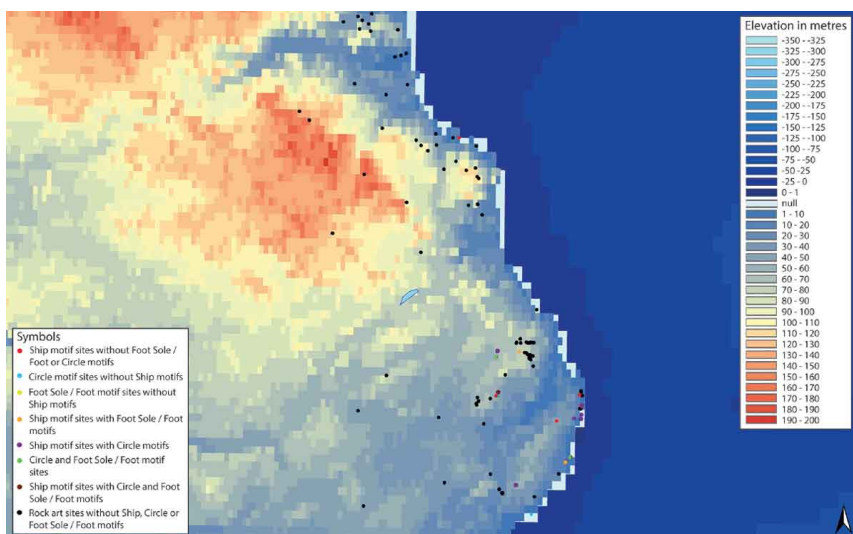


Figure 4.48. Distribution of Ship, Circle and Foot Sole/Foot motif sites with both figurative and non-figurative motif sites in various combinations as they occur on their own or together at rock art sites in Simris, Skåne.

Motif distributions in Denmark and Skåne

Rock art blankets the landscape in Denmark and Skåne, though it predominantly consists of non-figurative motifs (e.g. Cup Marks; see Fig. 4.43 versus Fig. 4.44). Chapter 1 already emphasised that the majority of bronze objects with Ship imagery are found in southern Scandinavia, mainly Denmark (see Fig. 1.4).

Knowing this, it is striking to see how few rock art Ship motifs are located in the southern Scandinavian distribution maps. The lack of suitable rock outcrops for carving, which are so prevalent in the Swedish and Norwegian landscapes, is likely a factor for the lack of rock art in Denmark. In Denmark, Ships were depicted on available bronze, instead of unavailable rock. The majority of Ship carvings in Denmark are located on the island of Bornholm, which is geographically closer to Sweden, and has often been noted as an 'island anomaly' for this reason. The distribution maps clearly show that what few Ship motifs there are in southern Scandinavia are situated close to the coast or inland waterways, with a concentration in the northwest corner of Skåne and southeast corner of Skåne in Simrishamn municipality (Figs 4.43 and 4.44).

Circle motifs are distributed much more widely than Ship motifs, dotting the landscape both inland and along the coast (Fig. 4.45). More Circle motifs occur on sites of their own, without Ships, than occur on sites with them. This is especially apparent in Denmark. And Circles do not show an obvious distributional affiliation with Ships on bronze razors either. One of the densest clusters of bronze razors comes from the southwest region on the island Fyn, where no rock art Circle motifs have been recorded. There are fewer Foot Sole/Foot motifs than Circle or Ship motifs, but these too have a wider distribution than the Ship motif. They appear along the coast as well as inland, and exist on sites more often without Ship motifs than with them (Fig. 4.46). It is not surprising then, that the number of Ship sites that occur with both Circle and Foot Sole/Foot motifs is minimal (Fig. 4.47).

It is also beneficial to look at Simris in greater detail, alongside the larger-scale picture of southern Scandinavia. For other than Bornholm, Simris contains the most significant cluster of figurative rock art sites with Ship motifs in Denmark and Skåne (Fig. 4.44). In the Simrishamn municipality, the majority of rock art sites do not contain Ship motifs. The main cluster of figurative rock art is in the Simris area, where the majority of rock art sites *do* contain Ship motifs (Fig. 4.48). Circle and Foot Sole/Foot motifs behave similarly to the Ship motif in this area, and Ship motifs are often located at the same sites as Circle motifs. In fact only a couple of Circle motifs occur on sites without Ship motifs and Foot Sole/Foot motifs occur only on sites with either Ship or Circle motifs. This is unlike the pattern identified in Denmark.

Motif occurrences in Denmark and Skåne

The behaviour of motif occurrences in southern Scandinavia is quite different than the previous site study areas. The Foot Sole/Foot motif is the 2nd highest occurring figurative motif, the Circle motifs are 3rd and the Ship motif is 4th (see Table 4.14). Even if the Circle motifs were not combined, the Sun Cross/Wheel/Wheel Cross and Ring motifs are the 4th and 5th highest occurring figurative motif. There are very few Animal motifs (the same number as in Hordaland/Rogaland), though southern Scandinavia contains 15% of all Wheeled Vehicle motifs in Scandinavia.

There are significantly fewer Ship motifs in southern Scandinavia compared to the other site study areas. Less than 2% of the total number of Ship motifs in Scandinavia is located in this region. This is not entirely surprising as Denmark and Skåne, which together are geographically larger than any of the other site

study areas, contain less than 15% of the total number of rock art sites in Scandinavia. The average number of Ship motifs per Ship site (5.05) is lower than that in Scandinavia (7.29) and there are no Ship sites that contain more than 50 Ship motifs (see Table 4.16). As the distribution maps show, the largest concentration of Ship motif sites is actually found on Bornholm, the Danish island that is geographically closer to Sweden.

The Circle motif behaves slightly differently than the Ship motif. There are 287 Circle motifs, comprising just over 8% of the total number of Circle motifs in Scandinavia. The majority of these sites contain between 1 and 5 Circle motifs, yet one site (of the three that exist in Scandinavia) contains between 51 and 200 Circle motifs. Cup and Ring motifs are poorly represented, comprising less than 1% of the total in Scandinavia. Yet the 2nd highest concentration of Sun Cross/Wheel/Wheel Cross motifs of the five site study areas occurs in this region: almost 18% of all Sun Cross/Wheel/Wheel Cross motifs in Scandinavia. Because the total number of Ships is so small, it is not surprising that only 24 of the 91 Circle sites also contain Ship motifs (26%).

The Foot Sole/Foot motif is the 2nd highest occurring figurative motif in southern Scandinavia. Interestingly, it is outnumbered only by Oval motifs. If the Oval motif were included in the Circle category this region would be dominated by Circle motifs. The 447 Foot Sole/Foot motifs comprise only 11% of the total number in Scandinavia. More Foot Sole/Foot motifs are located in the Trøndelag, Østfold and Bohuslän regions. However, southern Scandinavia boasts the only site with over 200 Foot Sole/Foot motifs.

Motifs and water in Denmark and Skåne

There are only 298 Ship motifs in the large geographical area of Denmark and Skåne. The lack of Ship motifs in this region was evident in the distribution maps and motif occurrences analyses. The Ships that are located in southern Scandinavia demonstrate a clear connection to the coastline: 36% of all Ship motifs occur within 1 km, and nearly 60% occur within 2 km of the coastline. The same factor considered in Hordaland and Rogaland is also a factor in this scenario. There was less shoreline displacement in Denmark and Skåne; therefore their relationship to present-day coastlines will be relatively stronger. As in Hordaland and Rogaland, the clustering close to the coastline also results in a weaker R-squared value (0.275).

There is also a clear connection of Circle motifs to the coastline, up to a certain distance. 30% of all Circle motifs occur within 1 km, and 42% occur within 2 km of the coastline. Only 121 Circle motifs occur further than 5 km from the coastline, but this number is larger than the 7 Ship motifs that occur further than this distance. It is equally significant that 35% of Circle motifs are located more than 25 km from the coastline. There are significantly more Foot Sole/Foot motifs than either Ship or Circle motifs. Only 10% of Foot Sole/Foot motifs are located within 1 km of the coastline, which is unlike the quantities of Ship and Circle motifs that are located within this distance interval. A large quantity (66%) of Foot Sole/Foot motifs are located within 4–5 km of the coastline. Though there are less Foot Sole/Foot motifs that occur further than 25 km from the coastline than Circle motifs, neither are as significantly bound to the coastline as the Ship motif.

Ships and water: data summary

Certain patterns have been identified in Scandinavia and in the site study areas regarding motif distributions, motif occurrences and motif distances to the coastline. A number of similarities and differences amongst these various regions have been highlighted, and they are summarised here.

Table 4.15a. Date summary: from top to bottom, in order from greatest to least quantity. Column A: the figurative motif name (x motif). Columns B–G: the total number of x motif in the site study area. Column H: the total number of x motif in Scandinavia.

A Motif		B	C	D	E	G	H
		North/South Trøndelag total	Hordaland/ Rogaland total	Østfold/ Bohuslän total	Uppland total	Southern Scandinavia total	Scandinavia total
1	Ship	996	1099	11,240	1799	298	19,322
2	Human	127	84	3703	158	31	4,649
3	Animal	632	33	2313	188	33	4,565
4	Foot Sole/Foot	583	188	812	445	447	4,005
5	Oval	40	21	184	554	537	2,315
6	Ring	177	262	687	133	115	2,014
7	Other Definable	135	190	780	67	64	1,587
8	Sun Cross/Wheel/Wheel Cross	30	32	362	46	158	897
9	Weapon	4	5	185	10	106	511
10	Cup and Ring	110	15	151	45	7	412
11	Frame	12	28	17	0	4	255
12	Wheeled Vehicle	0	0	125	2	24	160
13	Spiral	25	9	48	3	7	128
14	Cross	14	11	32	4	7	87
15	Track Mark	0	0	34	0	3	76
16	Tree	0	8	22	3	0	63
17	Hand/Arm	7	3	8	0	19	37
18	Tool	0	0	31	0	0	33
19	Plough	2	0	27	0	2	32
20	Net	5	7	10	0	0	30
Total		2899	1995	20,771	3457	1,862	41,178

Motif distributions

The distribution maps showed on a very broad scale that *most figurative rock art sites are located close to water*, though to varying degrees. This is notable, for it is usually the Ship that is discussed as having this special connection to water. The non-figurative sites, on the other hand, tended to spread out over larger geographical areas in the site study regions. They were located at a wider range of elevations and more varied distances to the coast. The distribution maps also showed that the number of sites containing Ship, Circle and Foot Sole/Foot motifs together differed in the various site study areas. This implies that there is a stronger connection amongst the three main motifs in some areas, and a weaker connection in others. In Uppland, Trøndelag, Østfold and Bohuslän, Ship, Circle and Foot Sole/Foot motifs are clustered together and often occur at the same sites. In Hordaland, Rogaland and southern Scandinavia, there are far fewer sites where Ships occur at the same sites as Circle and Foot Sole/Foot motifs.

Motif occurrences

The motif occurrences in each site study area and Scandinavia can be compared within a series of summary tables. For example, the tables show that 80% of all Human motifs are located in Østfold and Bohuslän, whereas only 0.67% are

located in southern Scandinavia (Table 4.15a–b). The three main motif occurrences should also be compared to general concentration of rock art sites in the study area (Table 4.16). For example, Østfold and Bohuslän comprise nearly 20% of all rock art sites in Scandinavia and contain 58% of all Ship motifs. Denmark and Skåne comprise nearly 15% of all rock art sites in Scandinavia; yet contain only 1.5% of all Ship motifs. The same comparisons can be made with Circle motifs (Table 4.17) and Foot Sole/Foot motifs (Table 4.18). The summary tables help to disavow or confirm certain assumptions, and affirm surprising oddities that were already identified in this chapter. Some key points are as follows.

Table 4.15b. Columns I–M: the percentage the region’s total of x motif (Columns B–G) comprises of the total number of x motif in Scandinavia (Column H).

A Motif		I % x motif in Trøndelag region comprises of x motifs in Scandinavia	J % x motif in Hordaland/ Rogaland comprises of x motifs in Scandinavia	K % x motif in Østfold/ Bohuslän comprises of x motifs in Scandinavia	L % x motif in Uppland comprises of x motifs in Scandinavia	M % x motif in southern Scandinavia comprises of x motifs in Scandinavia
1	Ship	5.15%	5.69%	58.17%	9.31%	1.54%
2	Human	2.73%	1.81%	79.65%	3.40%	0.67%
3	Animal	13.84%	0.72%	50.67%	4.12%	0.72%
4	Foot Sole/Foot	14.56%	4.69%	20.27%	11.11%	11.16%
5	Oval	1.73%	0.91%	7.95%	23.93%	23.20%
6	Ring	8.79%	13.01%	34.11%	6.60%	5.71%
7	Other Definable	8.51%	11.97%	49.15%	4.22%	4.03%
8	Sun Cross/Wheel/ Wheel Cross	3.34%	3.57%	40.36%	5.13%	17.61%
9	Weapon	0.78%	0.98%	36.20%	1.96%	20.74%
10	Cup and Ring	26.70%	3.64%	36.65%	10.92%	1.70%
11	Frame	4.71%	10.98%	6.67%	0.00%	1.57%
12	Wheeled Vehicle	0.00%	0.00%	78.13%	1.25%	15.00%
13	Spiral	19.53%	7.03%	37.50%	2.34%	5.47%
14	Cross	16.09%	12.64%	36.78%	4.60%	8.05%
15	Track Mark	0.00%	0.00%	44.74%	0.00%	3.95%
16	Tree	0.00%	12.70%	34.92%	4.76%	0.00%
17	Hand/Arm	18.92%	8.11%	21.62%	0.00%	51.35%
18	Tool	0.00%	0.00%	93.94%	0.00%	0.00%
19	Plough	6.25%	0.00%	84.38%	0.00%	6.25%
20	Net	16.67%	23.33%	33.33%	0.00%	0.00%

Ship

The quantities of Ship motifs in each region vary (Table 4.16). More than half of all Ships in Scandinavia are located in Østfold and Bohuslän, whilst only 9% of Ship motifs are located in Uppland, almost 6% in Hordaland and Rogaland, 5% in Trøndelag, and less than 2% in southern Scandinavia. These percentages demonstrate where rock art Ships are clustered in higher concentrations in Scandinavia. The different quantities of Ships in each region can then be compared to the percentage of rock art sites on which Ships appear in each region. This comparison could illustrate how concentrated Ship motifs are per site. For example, 996 Ship motifs are located in Trøndelag, and they occur on approximately 46% of rock art sites. Therefore, it would appear that Ship motifs are dispersed on many sites across the region. This conjecture is further supported by calculating the median number of Ship motifs per site, which in Trøndelag is two. These results can also be compared to the other site study areas. Ship motifs

are located on 38% of rock art sites in Østfold and Bohuslän, and the median number of Ship motifs per site is three. Ship motifs are located on 22% of rock art sites in Hordaland and Rogaland, and the median number of Ship motifs per site is five. The median numbers demonstrate that generally Ship motifs occur in low concentrations per site, which implies that sites with high concentrations of Ship motifs were significant.

Table 4.16. Column B: the total number of rock art sites in reach region. Column C: the percentage rock art sites in x region (Column B) comprise of all rock art sites in Scandinavia (22,044). Column D: the total number of Ship motif sites in x region. Column E: the percentage the total number of Ship sites in x region (Column D) comprise of all rock art sites in x region (Column B). Column F: the total number of Ship motifs in x region. Column G: the percentage the total number of Ship motifs in x region (Column F) comprise of all Ship motifs in Scandinavia (19,314). Column H: the Mean number of Ship motifs at Ship sites in x region. Column I: the Median number of Ship motifs at Ship sites in x region.

A Region	B Rock art sites	C % rock art sites in x region comprise of rock art sites in Scandinavia	D No. Ship sites	E % Ship sites in x region comprise of rock art sites in x region	F No. Ship motifs	G % Ship motifs in x region comprise of Ship motifs in Scandinavia	H Mean number of Ship motifs at Ship sites	I Median number of Ship motifs at Ship sites
Uppland	2936	13.32%	368	12.53%	1799	9.31%	4.89	2
North	129		67	51.94%	940	4.87%	14	3
Trøndelag								
South	49		15	30.61%	56	0.29%	3.7	2
Trøndelag								
Combined region	178	0.81%	82	46.07%	996	5.16%	12	2
Østfold	379		187	49.34%	1196	6.19%	6.4	3
Bohuslän	3955		1468	37.12%	10,044	52.00%	6.84	3
Combined region	4334	19.66%	1655	38.19%	11,240	58.20%	6.79	3
Hordaland	177		17	9.60%	223	1.15%	13.1	11
Rogaland	108		46	42.59%	876	4.54%	19.04	3
Combined region	285	1.29%	63	22.11%	1099	5.69%	17.44	5
Denmark	1337		37	2.77%	120	0.62%	3.24	2
Skåne	1903		22	1.16%	178	0.92%	8.09	3
Southern Scandinavia	3240	14.70%	59	1.82%	298	1.54%	5.05	2
Scandinavia	22,044		2639	11.97%	19,314		7.29	3

Circle

The Circle motif can be evaluated using similar methods. The quantities of Circle motifs in each region are as varied as the quantities of Ship motifs (Table 4.17). The largest percentage of Circle motifs is located in Østfold and Bohuslän (36%), about 10% are located in Trøndelag, 9% in Hordaland and Rogaland, 8% in southern Scandinavia and 7% in Uppland. As with the Ship motifs, Circle motifs generally appear in low concentrations per site, which is confirmed by the small mean and median numbers in each site study area and in Scandinavia. Circle motifs occur on over a quarter of all rock art sites in Trøndelag, and the median number of Circle motifs per site is 2.5. Circle motifs occur on 16% of rock art sites in Hordaland and Rogaland, and the median number of Circle motifs per site is one. The Circle motifs can also be compared to Ship motifs (Table 4.15a–b). Ship motifs occur on 38% of rock art sites in Østfold and Bohuslän, but Circle motifs occur on only 11% of rock art sites in Østfold and Bohuslän. And more often than not, Ships and Circles occur on the same sites. 83% of Circle sites also contain Ship

motifs in Østfold and Bohuslän, 74% in Trøndelag, 73% in Uppland, 61% in Hordaland and Rogaland and 26% in southern Scandinavia.

Table 4.17. Column B: the total number of rock art sites in reach region. Column C: the percentage rock art sites in x region (Column B) comprise of all rock art sites in Scandinavia (22,044). Column D: the total number of Circle motif sites in x region. Column E: the percentage the total number of Circle sites in x region (Column D) comprise of all rock art sites in x region (Column B). Column F: the total number of Circle motifs in x region. Column G: the percentage the total number of Circle motifs in x region (Column F) comprise of all Circle motifs in Scandinavia (3448). Column H: the Mean number of Circle motifs at Circle sites in x region. Column I: the Median number of Circle motifs at Circle sites in x region.

A Region	B Rock art sites	D % rock art sites in x region comprise of rock art sites in Scandinavia	C No. Circle sites	E % Circle sites in x region comprise of rock art sites in x region	F No. Circle motifs	G % Circle motifs in x region comprise of Circle motifs in Scandinavia	H Mean number of Circle motifs at Circle sites	I Median number of Circle motifs at Circle sites
Uppland	2936	13.32%	85	2.90%	227	6.58%	2.67	1
North	129		36	27.91%	291	8.44%	8.08	2.5
Trøndelag								
South	49		10	20.41%	51	1.48%	5.1	3
Trøndelag Combined region	178	0.81%	46	25.84%	342	9.92%	7.43	2.5
Østfold	379		69	18.21%	183	5.31%	2.66	2
Bohuslän	3955		417	10.54%	1065	30.89%	2.55	1
Combined region	4334	19.66%	486	11.21%	1248	36.19%	2.57	2
Hordaland	177		25	14.12%	184	5.34%	2.74	1
Rogaland	108		21	19.44%	134	3.89%	2.8	1
Combined region	285	1.29%	46	16.14%	318	9.22%	2.76	1
Denmark	1337		62	4.64%	189	5.48%	2.74	1
Skåne	1903		29	1.52%	98	2.84%	2.8	1
Southern Scandinavia	3240	14.70%	91	2.81%	287	8.32%	2.76	1
Scandinavia	22,044		984	4.46%	3448		2.73	1

Foot Sole/Foot

Both comparable and incomparable patterns were identified with Foot Sole/Foot motifs. Their quantities are more varied amongst the site study areas, which highlights interesting regional differences (Table 4.18). There are almost an equal number of Foot Sole/Foot motifs in southern Scandinavia (447) as in Uppland (445), which is a significantly smaller region. Still the greatest quantity of Foot Sole/Foot motifs is located in Østfold and Bohuslän (812). However, unlike with the Ship and Circle motifs, the gap between the highest and second highest concentration of Foot Sole/Foot motifs is much smaller. For example, 11,240 Ship motifs occur in Østfold and Bohuslän, which is significantly more than the second highest concentration of 1799 Ship motifs that occur in Uppland. Similarly, there are 1248 Circle motifs in Østfold and Bohuslän and the second highest concentration is in Trøndelag, where there are 342 Circle motifs. The second highest concentration of Foot Sole/Foot motifs is located in Trøndelag (583), which is not significantly less than the 812 located in the rock art rich area of Østfold and Bohuslän. It is also interesting that Foot Sole/Foot motifs occur at more varied concentrations per site across the site study areas, as shown by the mean and median numbers of Foot Sole/Foot motifs per site. Could this imply that the meaning and purpose of Foot Sole/Foot motifs was more mutable than the

Circle or Ship motifs?

Table 4.18. Column B: the total number of rock art sites in reach region. Column C: the percentage rock art sites in x region (Column B) comprise of all rock art sites in Scandinavia (22,044). Column D: the total number of Foot Sole/Foot motif sites in x region. Column E: the percentage the total number of Foot Sole/Foot sites in x region (Column D) comprise of all rock art sites in x region (Column B). Column F: the total number of Foot Sole/Foot motifs in x region. Column G: the percentage the total number of Foot Sole/Foot motifs in x region (Column F) comprise of all Foot Sole/Foot motifs in Scandinavia (4003). Column H: the Mean number of Foot Sole/Foot motifs at Foot Sole/Foot sites in x region. Column I: the Median number of Foot Sole/Foot motifs at Foot Sole/Foot sites in x region.

A Region	B Rock art sites	C % rock art sites in x region comprise of rock art sites in Scandinavia	D No. Foot Sole sites	E % Foot Sole sites in x region comprise of rock art sites in x region	F No. Foot Sole motifs	G % Foot Sole motifs in x region comprise of Foot Sole motifs in Scandinavia	H Mean no. Foot Sole motifs at Foot Sole motif sites	I Median no. Foot Sole motifs at Foot Sole motif sites
Uppland	2936	13.32%	105	3.58%	445	11.12%	4.24	2
North	129		30	23.26%	513	12.82%	17.1	6
Trøndelag								
South	49		11	22.45%	70	1.75%	6.36	4
Trøndelag								
Combined	178	0.81%	41	23.03%	583	14.56%	14.22	4
region								
Østfold	379		33	8.71%	80	2.00%	2.42	2
Bohuslän	3955		227	5.74%	732	18.29%	3.22	2
Combined	4334	19.66%	260	6.00%	812	20.28%	3.12	2
region								
Hordaland	177		7	3.95%	93	2.32%	13.29	9
Rogaland	108		15	13.89%	95	2.37%	6.33	3
Combined	285	1.29%	22	7.72%	188	4.70%	8.55	4
region								
Denmark	1337		17	1.27%	47	1.17%	2.76	2
Skåne	1903		40	2.10%	400	9.99%	10	2
Southern	3240	14.70%	57	1.76%	447	11.17%	8.84	2
Scandinavia								
Scandinavia	22,044		726	3.29%	4003		5.51	2

Motifs and water

The distances measured from rock art motifs to the coastline or to inland water were plotted on scattergrams that show simple linear regressions. Their measured statistical fit to the model (R-squared) was also given. The R-squared results demonstrate the strength of a specific pattern: whether or not the frequency of the motif declines the further it is from a water source. The correlation strength is affected by the use of distance intervals. By using 1 km distance intervals up to 25 km from water, null fields where there are no sites are still plotted in the scattergrams. The other option is to plot each site individually, which previous tests have shown to be less effective (Nimura 2013a). The use of distance intervals does affect the correlation strengths, yet it gives set parameters that allow us to compare the scattergrams across Scandinavia and the site study areas. If we compare the R-squared results in this chapter it is clear that *in Scandinavia, the frequency of Ship, Circle and Foot Sole/Foot motifs declines the further they are from a water source*. The Ship, however, shows the strongest correlation. The R-squared for the three main motifs vary in the site study areas. For example, all three motifs have a stronger correlation in Østfold and Bohuslän than in Scandinavia.

The scattergrams only provide evidence for one specific pattern, but we can also look at other aspects of the relationship between rock art and watery locations.

The quantity of motifs within a specific distance interval is also illuminating. In Scandinavia, a larger percentage of Ships occur within 1 km of a water source than Circle or Foot Sole/Foot motifs. But this is not always the case when we look at specific regions. An exceptional example is in Denmark, where nearly 70% of Foot Sole/Foot motifs occur within 1 km of the water, which is a far greater percentage than the 45% of Ship motifs. The coastline-only or coastal and inland water distances and the quantity of motifs in each distance interval should be analysed in relation to known shoreline displacement data and published case studies. For in areas where there was minimal shoreline displacement, such as Hordaland and Rogaland, the data display the strongest connection to the present-day coastline. The published case studies also highlight changes in production throughout prehistory. In Bohuslän and Uppland, Ling (2014; 2012) has confirmed that rock art sites tended to stay bound to water even as shorelines receded in the Late Bronze Age. In Hordaland and Rogaland, where environmental change was minimal, carvings tended to be bound to the shorelines throughout the Bronze Age but the decline in production was more drastic at the end of the Bronze Age. The quantity of Ship motifs falls from 1074 in the Bronze Age, with the majority occurring in the Early Bronze Age, to seven in the Iron Age.

Though rock art is exceedingly varied from region to region and from site to site, these data have produced a number of patterns that may support a range of general theories for Scandinavian rock art, especially in the Bronze Age. In the next chapter these results are used as a basis from which to discuss theories of the agency of rock art and its relationship to the environment.

PART III

5. ROCK ART, AGENCY AND ENVIRONMENTAL CHANGE

Rock art in Scandinavia, as we have now seen, blankets the landscape from the northernmost parts of Norway to the southernmost parts of Denmark. It is found in various contexts from the top of rock outcrops in inland mountainous regions of Sweden down to portable slabs in Danish graves. It depicts a plethora of images from Mesolithic game animals to Bronze Age axes. It is nothing if not diverse, in its execution, archaeological context and style. This diversity was affirmed by the data analyses, which emphasised distinct regional differences in the types and quantities of motifs made, their chronologies, and their relationship to the landscape. At the beginning of this book it was noted that regional studies of rock art in Scandinavia are imperative in order to articulate theories for smaller geographical areas, as a consequence of this diversity. However these smaller-scale regional theories are often inapplicable in areas outside of their areas of origin; and they have often lacked general theory that can be used for larger-scale comparison. As Goldhahn (2008a, 17) once stated, 'How these very obvious regional differences could and/or should be understood has not been discussed since Mats P. Malmer's 'chorological study' of 1981'. Despite its diversity, scholars of this pictorial material culture have not shied away from using it as a source for comprehending the more symbolic aspects of prehistoric life. We have looked at many interpretations throughout this book that aim to understand rock art in terms of religion, cosmology, ritual and belief in prehistoric Scandinavia. In this final chapter a theory will be proposed that provides another explanation for the behaviour of rock art, primarily in the Bronze Age. This theory, supported by the pan-Scandinavian analyses, is supplementary to many of the key interpretations we have encountered and will revisit in this chapter.

Changes to the landscape, such as shoreline displacement, must have affected the purpose and meaning of rock art for prehistoric communities. This is because rock art was so intertwined with the landscape in which it was created. As Coles (2005, 101) elegantly and succinctly describes,

Sea-water had an important role but one that changed over time; a landscape studded with rock carvings linked to the existing sea-level would be altered and probably lose much of its contemporary purpose as the waters withdrew in discernible and inexorable patterns... The important point in all this is that the coasts of Bohuslän and Østfold were not fixed, they were mobile and societies had to accept the variability and be prepared to adapt and develop concepts originally inappropriate to the conditions.

The altered coastlines of the Bronze Age in Scandinavia were considered in

conjunction with the data analyses in Chapter 4. The results of the analyses did not draw a black and white picture, but one in many shades of grey. This reminds us that on such a large scale there are many variables that make patterns difficult to discern, and patterns identified can appear and disappear depending on the scale of analysis. The patterns of motif behaviour identified in Chapter 4 could support a number of different interpretation theories, but they generally provide further insight into rock art's connection to water. Key patterns that the data illuminated were outlined at the conclusion of Chapter 4 and some of these will be used to support interpretations presented in this chapter. At the very least the data confirm that Ship motifs and other key figurative motifs occur close to the coastline or bodies of water. But we have also been reminded again and again of the complexity borne from regional difference.

Countless theories are proposed for the purpose and meaning of rock art on smaller geographical scales. We can interpret rock art as a social format for action, as a stabilising element of chieftain societies, as a player in the intricate mix of maritime praxis, or as a place where complex rituals took place to solidify and promote specific cosmologies. And the majority of these interpretations (at least those in the last decade) incorporate, and often depend on, rock art's place in the landscape. Chapter 2 established that the landscape was an important factor in choosing rock art sites. That chapter also investigated the nature of the relationship of maritime environments, rock art and its makers. This investigation will be revisited in this chapter, but will focus more on perception and cognition. For understanding how prehistoric peoples might have perceived their environments is fundamental to understanding why the landscape was integral in choosing rock art sites, and subsequently why fluctuations to these landscapes would have affected rock art's meaning and purpose.

Skoglund (2013a) proposes that changes to the landscape would have caused major shifts in symbolic thinking. His terrestrial example is the emergence of the Hallstat C, which brought about a significant change in land-use and settlements in southern Scandinavia. He argues that these changes to the landscape may have been the impetus of a shift in symbolic thinking for the south Scandinavian Bronze Age culture. Recently Goldhahn (2013, 254) argued that 'landscape cognition' and Bronze Age cosmology are intertwined. To demonstrate this intertwined relationship he presents what he refers to as a deceptively idealised framework (Goldhahn 2013, 254: table 14.1 and fig. 14.3; Kristiansen and Larsson 2005). In this cognitive landscape, monuments are located in high places (connected to an upper realm), settlements and rock art occur on sand, moraine and clay soils (connected to a middle realm), and special bronze items ritually deposited in water or underground are connected to a lower realm. What is interesting to note in this framework is that rock art is actually connected to all three realms. It is located in the upper realm (e.g. inside large monuments such as at Bredarör at Kivik), and it also contains motifs from the upper realm (e.g. sun symbols). It is located in the middle realm on rock outcrops, and also depicts objects from the middle realm (e.g. ploughs, carts) and the lower realm (e.g. bronze axes that are ritually deposited). The distribution amongst and depiction of these cosmological spheres exemplifies why rock art may be the ideal subject for an exploration of prehistoric perception and cognition expressed in material culture.

Published case studies and geospatial analyses together show that the

landscapes in which rock art, namely figurative motifs, is found were predominantly maritime landscapes. Chapters 2 and 4 also reiterated that environmental changes, namely glacio-isostasy, caused shoreline displacement to occur in many areas of Scandinavia, sometimes so drastically that it would have been visible to the communities inhabiting these maritime zones. It is likely that prehistoric peoples could have perceived changes to the landscape, such as shoreline displacement. How did these changes affect prehistoric communities' relationship with the maritime environment? How might they have reacted? Could environmental changes have posed a threat to their worldviews, and the rock art that promoted these worldviews? These questions may be better addressed by using cognitive, landscape and maritime archaeological theories.

To support the proposition that the meaning and purpose of rock art was affected by environmental change, theories of material agency will also be used. A primary source is the anthropologist Alfred Gell, whose theory of agency and the agency of artefacts and material culture is one tool we can use to discuss the possible effects of environmental change on the production and consumption, purpose and meaning of rock art. The main argument is: if rock art has agency it is an active entity that can have effects on, and be affected by, society and even possibly elements of the environment. By combining theories from anthropology and landscape, maritime and cognitive archaeology with published accounts and the data from Chapter 4, this theory may be further developed.

Perception, cognition and the importance of material culture

Landscape was an important factor in choosing rock art sites. It is possible then that any significant changes in these landscapes would affect the meaning or purpose of rock art to its producers and consumers. Concepts such as perception and cognition (what we experience sensorially and how we create knowledge of these experiences) are key to informing how prehistoric peoples might have experienced their surroundings. Throughout this book, various theories from maritime archaeology and landscape archaeology have been presented, which share commonalities in their approaches to the relationship of human and environment, their conjectures on how we perceive our environment, and their approaches to the function of art in prehistoric societies. Cognitive archaeology also addresses these topics, but draws on the neurosciences to define perception and cognition, offering a different approach to the study of prehistoric art.

Cognitive studies that seek to define the possible cognitive functions and capacities of the prehistoric mind have influenced archaeologists' conjectures for the possible functions of prehistoric art. From the earliest *Homo sapiens* to the pre-literate societies of the Mesolithic to Early Iron Age in Scandinavia, it is claimed that many cognitive morphological and biological changes occurred. Some we can see osteologically and others are less visible, only evident in the reconstruction of cognitive processes and actions in modern day humans. In the tradition of cognitive archaeology, the appearance of art objects in the archaeological record has often been seen as 'proof' of the emergence of more complex cognitive processes: e.g. symbolic thought, memory storage and graphic representation. These studies focused mainly on the evolution of complex cognitive abilities and

their consequences, for example, the causal connection between the advent of language and the complexity of society. Though the study of cognitive evolution can be criticised for its sometimes-unchecked subscription to evolutionary theory and is often under scrutiny (see Coolidge and Wynn 2009), it is only one aspect of cognitive archaeology. One can still find points of interest in cognitive approaches. Much of the current discourse today revolves around prehistoric perceptions of their surroundings and the importance of objects that inhabit these surroundings. Theories derived from neuroscience and the study of cognitive changes in evolution form the basis for some archaeologists who aim to make materials/objects more central to social relations and better understand the interaction of humans and environment, and humans and material culture.

A few basic concepts must be outlined before investigating the role of material culture in social relations. Let us start with the definitions of perception and cognition, which can be described as the main dialectic components of information processing (Solso 2003, 80). *Perception* is the process of experiencing sensations outside our body, whilst *cognition* is the process that converts the sense data into relevant knowledge (Frith 2009). These are generalised (and fairly conventional) definitions of perception and cognition, but it could also be argued that a person's cognitive background will influence and give meaning to their experiences: the process of creating knowledge is changeable (Solso 2003, 76). As the art historian Ernst Gombrich (1977 [1960], 275) claimed, 'While our common human physiology no doubt results in our having universal, generalized responses to certain stimuli, perception is an active and cognitive process in which cultural factors play a dominant role. Perceptions are cultural phenomena'.

A person's cognitive background gives meaning to experience. It is also fundamental to their conceptual development, as distinctions begin to be drawn about things that one encounters in their environment, be it people or objects. The creation of these distinctions leads to the defining of certain principles and categories, which then guide our inferences about the things we encounter (Boyer 1999, 207; 1998). The categories borne from these distinctions are what Pascal Boyer refers to as 'ontological domains', within which the principles 'deliver intuitive explanations for observed states' and also create expectations about future experiences (1999, 207). So ontological domains are cyclically connected to the underlying processes that are defined in order to explain observed states. These underlying processes/assumptions are commonly referred to in developmental psychology as 'skeletal principles' (Gelman 1990; Boyer 1999, 208). Ontological domains and skeletal principles have often been discussed among cognitive archaeologists, though not necessarily by those names. Steven Mithen (1996) writes of four domains of intuitive knowledge, similar to Boyer's 'ontological domains', from which skeletal principles (underlying processes and assumptions) are extrapolated. The four domains are: intuitive physics, intuitive psychology (often referred to as the *theory of mind*), intuitive biology and intuitive language. Why is this relevant to our investigation of human/environment and human/object relations?

Let us start with intuitive biology. Intuitive biology proposes that as children we create and maintain certain essentialist beliefs in the world of living things (Gelman *et al.* 1994). In this process 'essences' are assigned to living things and subsequently categorised, which can have manifold effects on our beliefs and

expectations of our environments. For example, by ascribing essences we believe that living things of the same category maintain their identity even when they undergo superficial transformations (if you paint zebra stripes on a white rabbit, we still recognise it as a rabbit and not a zebra) (Gelman *et al.* 1994, 344–47). The existence of intuitive knowledge or ontological domains implies that the mind is compartmentalised. For evolutionary psychologists the mind is also constantly adapting: it is ‘an evolved mechanism which has been constructed and adjusted in response to the selective pressures faced by our species during its evolutionary history’, a concept that has also been adopted by cognitive archaeologists (Mithen 1996, 420). Boyer and H. Clark Barrett (2005, 96) also refer to this idea, though they define it as ‘different domains of competence’. Each of the different domains

corresponds to recurrent evolutionary problems, is organised along specific principles, is the outcome of a specific developmental pathway and is based on specific neural structures. What we call a “human evolved intuitive ontology” comprises a catalogue of broad domains of information, different sets of principles applied to these different domains as well as different learning rules to acquire more information about those objects. All this is intuitive in the sense that it is not the product of deliberate reflection on what the world is like. (Boyer and Barrett 2005, 96)

The developmental, cognitive and evolutionary psychologists have similar conceptions of modularity in the mind and are each evaluating development, albeit in very different time-scales. The structures that exist, whether in the biological brain or in the learned assumptions at different times in a person’s life, are in place to enable us to create knowledge from our experiences.

These concepts establish a base from which to scrutinise the importance of material culture to our understandings of the world. Another useful concept for our discussion is ‘plasticity’. Plasticity refers to the ability of neurons and neural connections to adjust the nervous system to the body and the body’s environment (Nolte 2009, 608). Though this mostly occurs during development, in mature nervous systems ‘ongoing adjustments of connections and synaptic strength underlie processes such as learning and memory’ (Nolte 2009, 608). Returning to archaeology, Chris Gosden (2009) uses the concept of ‘plasticity’ to support his characterisation of the ‘dynamic’ nature of the relationship between people and objects, proposing that ‘human life unfolds through an equal input from materials and from people’ (Gosden 2009, 105). He refers to this as social ontology, which is a theory of reality that actively combines both the understandings derived from human senses and those derived from interactions with the materials that are focal points of human activity. Plasticity, when combined with the concepts presented in this section, supports the idea that our environments, which include material culture, can alter the ways in which we learn, remember and create new knowledge: ‘brains help make new objects, which in turn help create new brains’ (Gosden 2009, 109). The idea that material culture might have, and continues to, impact the evolution of the brain and mind, is currently more accepted. It is now established that ‘cognition does not take place in a mental black box, but is instead deeply informed, and indeed to some degree part of, an external environment’, one which includes material objects (Boivin 2008, 217).

The theories from cognitive evolution and neuro-, developmental, cognitive and evolutionary psychology have had immense influence on our understanding of perception and cognition, and are today almost paradigmatic in archaeology.

Many scholars from the cognitive sciences historically assumed universal, pre-social cognitive functions focusing on the biological aspect of brain processing, but these biological explanations of how we make knowledge from sense data continue to be scrutinised. Though neuroscience may show that there are some universal mental capacities at a base level, we can now imagine that they are culturally and socially affected.

There are multiple points of intersection between landscape and cognitive archaeology in regards to perception and cognition. Ingold's (2000) definitions of perception and cognition differ from the cognitive science definitions previously presented, as he uses ecological psychology as scaffolding for his theories. Cognitive sciences generally recognise perception and cognition as a two-step process: first the body experiences sense data, and then these data are turned into knowledge by the brain, in the act of cognition. The sense data are often characterised as a meaningless barrage of information that only becomes meaningful when the mind, by employing mental structures and representations, organises the data. The step following perception is *action*. We experience sensations, we turn them into knowledge and from this knowledge know how to act in the environment in a given situation. Ecological psychology alternatively suggests that 'perceptual activity exists not in the operation of the mind upon the bodily data of sense, but in the intentional movement of the whole being (indissolubly body and mind) in its environment' (Ingold 2000, 165). Sense data already have meaning if the person perceiving these data is treated 'not as a passive recipient of stimuli but as an active agent who purposively seeks out information that would specify the meaningful properties of his or her environment' (Ingold 2000, 164). By Ingold's definition, perception, cognition and action are indivisible; they are three steps rolled into one.

Perhaps these processes are best explained through the example of 'affordances'. Affordances, a concept derived from ecological psychology, describe the uses that things may have at the time of perception. This makes perception an inherently practical activity: 'to perceive an object or event is to perceive what it *affords*' (Ingold 2000, 166). Therefore, a human will view a table as a thing upon which other things can be placed, a chair as a thing that can be sat on, a refrigerator as a place in which food can be found. This is not done solely from memory (or by applying the pre-existent mental design), but rather affordances are defined by context and distinctions. The table is a thing upon which other things can be placed, but can actually perform other functions based on what a situation requires. Changing the way we think about perception, cognition and action is how Ingold attempts to redefine the nature of our relationship with the environment, and the starting point to propose an opposition to the 'built environment': the 'dwelling perspective'.

The dwelling perspective theorises a new system of relations in which 'the forms people build, whether in the imagination or on the ground, arise within the current of their involved activity, in the specific relational contexts of their practical engagement with their surroundings ... Only because they dwell therein can they think the thoughts they do' (Ingold 2000, 186). Whilst dwelling in the landscape, humans are forming the landscape: the landscape is therefore a record of the human lives that dwell and have dwelt in it. And because human lives exist for a specific amount of time there is a temporal aspect to the landscape. To

further explain this temporality Ingold defines landscape and taskscape, two entities that embody movement through time. Tasks are daily activities that we perform in a landscape and are the very acts of dwelling. The landscape is characterised as an aggregation of related features, and the taskscape is an aggregation of related activities (Ingold 1993, 158). In doing our tasks we are experiencing the passage of time in the place we dwell. These concepts are particularly relevant in regards to rock art, which is inherently part of the landscape as it uses rock outcrops, boulders and cave shelters as its canvas. Ingold's dwelling perspective gives agency to the environment. The dwelling perspective has the ability to form human perceptions, and consequently rock art could be seen to be a part of this system of humans forming landscape and landscape forming human understanding. What these theories favour is the fluid system of relations, the process and movement that exists between and amongst all things in an environment.

Fraser Sturt (2006) positions himself slightly differently than Ingold. Sturt (2006, 121) uses the work of sociologist/philosopher Henri Lefebvre on which to base his conceptions of space. He observes that the phenomenological perspective has focused on perception and experience but not on 'how *our* conceptions of space in the past inform and mesh with these [perception and experience] to produce understandings of lived space'. He draws on Lefebvre's concept of 'rhythmanalysis' to address this theoretical gap in his study of the East Anglian Fenland. Sturt critiques the way that archaeologists have adopted the phenomenological perspective of human and environment interactions. Phenomenological theories have often successfully fused nature and culture, but archaeologists who use this methodology tend to use tasks to identify the relationship between human and environment; this means that we can recognise 'what people were doing and when, but not perhaps why' (Sturt 2006, 126). This human/task-oriented perspective often leads to characterisations of societies by technology and economy. He argues that in coastal locations, this focus on 'tasks' has meant that the absence of task remnants is viewed as the absence of activity and action (Sturt 2006, 126). The sea, which does not always afford task remnants, is then assumed to be 'a boundary between the living and the dead and the intertidal are correspondingly a liminal zone' (Sturt 2006, 126). Sturt suggests a rhythmical approach to shed light on the process by which we arrive at our conceptions of space. Natural rhythms affect human rhythms, and investigating these rhythms, their contexts, and the various types of relationships that they generate will help us better understand the past (Sturt 2006, 129). This approach combines the study of perceptions and experiences with *conceptions* of space, emphasising temporality and fluid engagements that form individual and social lives (Sturt 2006, 137).

Cognitive archaeologies often focus on the emergence and analysis of symbolic thought and therefore symbolic behaviours and practices such as art making (see Barham 2007 for an alternative perspective). Despite critiques of cognitive archaeology, theories derived from the neurosciences are often used in the study of prehistoric art, and some of these theories have been reviewed in this section. Gosden's concept of social ontology was presented, which contributes to a better understanding of the importance of objects on the shaping of the human mind, where selective pressures alter mental modules. This section also reviewed Boyer's proposition that 'skeletal principles' are universal, yet what creates difference in

both an individual and in different societies is that these universal skeletal principles are then 'enriched' by cultural input and direct experience (e.g. by *artefacts* or *environment*) (Boyer 1999, 210). These theories have influenced the analysis of prehistoric art because they propose explanations for the web of relationships in which this material culture exists. Having established that material culture is a vital component of our perceptions and understanding of our world, we can theorise further about the various functions that material culture might have had in Scandinavian prehistoric communities. We arrive at the concept of material agency.

The agency of art

The theories explored in the previous section have paved a road to Gell and other anthropologists who seek to redefine the relationship of humans and objects by imbuing objects with agency. The term agency has been used for some time in social theory and archaeology, and the evolution of its use has recently been charted by John Robb (2010). Robb argues that the debate surrounding the term agency has developed significantly from 1998 when Gell's *Art and Agency* was published, and that the concept of agency has been subsumed into mainstream archaeological theory, making the term almost redundant. Yet an understanding of material agency is essential in order to postulate that rock art was not a passive entity, and that its powerful role in society enabled it to have an effect on and be acted upon by human agents. It is an investigation that is worth pursuing in this book.

Material agency is a relatively new concept derived from the concept of human agency, which has been a central topic of post-modern social theory. Very simply, human agency describes a human/agent's ability to act, with the intent to bring about a desired outcome. Material agency claims that an agent can also be an object, artefact, a natural entity or any non-living thing. The concept of material agency is one that was championed by Gell and Bruno Latour: the former under the auspices of the anthropology of art, and the latter within philosophy/history of science. Latour and his colleagues relied heavily on material agency to conceive 'Actor network theory', a relational system that has been embraced by archaeological theory. Ingold (2000) and others' theories of human/landscape interaction are dependent on the premise that relations between human and environment are fluid. Many theories of material agency also depend on this premise: we affect the environment but the environment also affects us. We make and shape objects but objects can also shape us. Actor network theory describes the relationships between 'actors' (aka 'agents'), and these actors can be anything from natural elements to humans, animals or objects. John Law (2009, 141) defines actor network theory as a 'disparate family of material-semiotic tools, sensibilities, and methods of analysis that treat everything in the social and natural worlds as a continuously generated effect of the webs of relations within which they are located'. Agents are defined by relationships, rather than a prescribed essence. This is a system in which nothing can be defined independently of anything to which it relates, and these relationships themselves are changeable and can be redefined. Studies of social networks, according to Latour (1996, 369),

focus solely on 'the *social* relations of *individual human* actors'. Actor network theory differs from this because it is inclusive of all things: things can affect human action as much as humans can have an effect on things (Robb 2010, 504–08). What actor network theory emphasises is the vital importance of material agency. From this platform it is possible to argue that rock art would have played a crucial role in material–human/human–environment/material–environment relationships, and in the promotion of worldviews, cosmologies and social structures in prehistoric Scandinavian societies. This argument is perhaps best supported by the work of Alfred Gell.

Gell argues that 'the objective of the anthropological theory of art is to account for the production and circulation of art objects as a function of this relational context [of social relations]' (Gell 1998, 11), and he uses the concept of material agency to achieve this. According to Gell existing theories from the anthropology of art tended to outline the function of art in one of two ways: symbolically, when art is experienced intellectually as a communicating object (the semiotic or linguistic model), and aesthetically, when art is experienced physically or emotionally. These two functions can be discrete but are not inherently dichotomous. Aesthetic experiences can be intellectual or physical, emotional etc., and symbols can also trigger emotional responses. Gell argued that these two main explanations, in any combination, fall short of exposing the existence and function of art within societies. His seminal theory is an alternative, where the art object is not just a symbol or an aesthetic motivator: it has agency and is always situated in a social context.

Gell's view of the definition and function of art is decidedly anti-aesthetic. He argues that aesthetics as a cultural element cannot be used as a universal tool for comparison, as it is too limited to specific works of art and not the 'social context of art production' or the 'social processes of interaction, through which they [works of art] are generated and sustained' (Gell 1998, 3). For Gell a single aspect of culture cannot be analysed independently of the society that makes it. He also takes a decidedly anti-linguistic stance and denies the understanding of art as inherently communicative, avoiding the definition of art as 'symbolic meaning'. Anthropologists such as Raymond Firth (1992, 16) use a structuralist approach that echoes the linguist Ferdinand de Saussure, and argue that art 'is a mode of communication and expression'. The archaeologist André Leroi-Gourhan was a key proponent of the structuralist interpretation of cave art. Leroi-Gourhan's (1968, see also 1982) initial work on French cave paintings concluded that the symbols in the paintings were akin to Saussurian signs, and therefore signified Upper Palaeolithic communities' conceptual understandings. This method of interpreting prehistoric art would dominate the field for decades. For Gell this is a paradigm to avoid: art objects are not just signs signifying meanings.

Instead of subscribing to a traditional system of symbolic communication, Gell creates a revised relational system comprised of actions: agency, intention, causation, result and transformation (Gell 1998, 6; Nimura 2013b). He argues that art is a 'system of action, intended to change the world rather than encode symbolic propositions about it' (Gell 1998, 6–7). Gell attempts to devise an unconventional definition of art, claiming that art is 'whatever is inserted into the 'slot' provided for art objects in the system of terms and relations envisaged in the theory', the theory being the 'social relations in the vicinity of objects mediating

social agency' (Gell 1998). He promotes a very theoretical idea of art, as defined by the social agents who 'name' it art, and who imbue it with agency: art is not 'art' because of a prescribed definition, but is created within the network of social relationships (Nimura 2013b).

To summarise Gell's (1998, 42) theory of art and agency we can start by defining the main components: *indexes* (the objects in question/art objects/secondary agents), *prototypes* (that which is represented by the object), *artists/human agents* (primary agents) and *recipients* (the audience, another agent, also referred to as *patients*, as the index causally affects them). In Gell's (1998, 20) own words, "Primary agents' are intentional beings who, through their actions, cause reactions in others. Secondary agents are artefacts [through which] primary agents distribute their agency in the causal milieu, and thus render their agency effective'. In other words, art objects distribute the primary agency that their makers imbued in them within a relational network. In Gell's theory the objects/indexes (secondary agents) must take on the role of persons, or social agents, in order to have agency themselves. This is different in actor network theory, which does not create hierarchies amongst things; 'things', whether human, natural or inanimate, are only defined by their relations to each other.

The interaction between human agent and object permits what Gell terms the *abduction of agency*: a cognitive operation whereby the agency of the primary agent is inspired by an index (the physical object/secondary agent) in the face of a viewer (who is also an agent). The abduction of agency is derived from Charles Sanders Peirce's theory of 'abductive reasoning', what Pierce referred to as 'guessing', which forms explanatory hypotheses from observations (Thagard and Shelley 1997, 413). This type of reasoning is differentiated from inductive reasoning (in which general principles are devised from facts) or deductive reasoning (in which facts are derived from general knowledge), both of which occur *after* abductive reasoning. The majority of examples of abductive reasoning that Gell cites are also drawn from science, for example in the creation of hypotheses. He argues that the abduction of agency fills the gap between semiotic inference, where meanings are derived from signs, and hypothetical inferences, which are not conventionally semiotic (Gell 1998, 14). He attempts to clarify this by using the example of a smile connoting friendliness. When we see someone smile we infer that they are friendly, or in a good mood etc, but this may not necessarily be true: the smile can incorrectly signify a number of emotions, moods, intentions or situations. He emphasizes that 'the means we generally have to form a notion of the disposition and intentions of 'social others' is through a large number of abductions from indexes which are neither 'semiotic conventions' or 'laws of nature' but something in between' (Gell 1998, 15). The importance of the agency of abduction lies with the outcome, the index, for this is the instrument of social agency (Gell 1998, 15–16). By defining the object/index as a mediator that has agency, it can therefore generate a causal reaction. This is the crux of Gell's theory of art and agency: that art can have agency, not of the objects' own making but that of its human agent (the primary agent), who intentionally imbues it with agency to generate an effect in the causal milieu.

Rock art, agency and environmental change

Archaeologists use concepts from the cognitive sciences to more fully integrate material culture into our fundamental perceptions of the world. And they also borrow theories from anthropology that give agency to material culture. Drawing on Gell and Latour, Gosden (1999, 120) claims that objects have the capacity to shape human behaviour, and argues that 'there is no such thing as social relations ... human relations are never simply between people, they always involve things as well'. Many of the ideas presented in this chapter from disciplines other than archaeology have been accepted into material culture studies and more specifically in rock art studies. The idea that rock art could have agency, and with it create an effect in the causal milieu, is a proposition that has many implications for this discussion.

Prehistoric sea-level changes were at times drastic, and the landscapes were visually and experientially different in antiquity. Shoreline-displacement studies have emphasised the need for both large-scale and small-scale studies, as sea-level changes were highly affected by local topology and bathymetry, as well as tidal ranges and weather events. Interpreting rock art sites within the context of the geological and ecological settings in which they were created is now common practice, and many of these studies have already been introduced in this book (see Bender, Hamilton and Tilley 2007 for a non-Scandinavian yet interesting example). There have been many recent publications that focus on shoreline displacement and rock art, the majority of which have largely focused on dating rock art (see Ling 2004; 2005; 2006; 2010; 2014; Sognnes 2003). Other studies on shoreline displacement and rock art have identified regional patterns in motif or style distributions. In central Norrland, Per Ramqvist (2002) asserts that no paintings occur in coastal areas, whilst carvings are found in coastal areas and close to inland lakes. Sognnes (2002) uses palaeoenvironmental data to recreate the prehistoric landscape in central Scandinavia, which allowed him to map the frequency and locations of elk and whale motifs in their prehistoric environments, informing new interpretations of these motifs.

Bradley and Tim Phillips (2004) compare the distributions of megalithic tombs and rock art on the islands of Tjörn and Örust on the west coast of Sweden in the Bohuslän rock art region. They analysed these distributions in relation to the different coastal contours that simulate Neolithic and Bronze Age coastlines. In this area, rock art is located close to tombs as well as to coastlines and sea channels. Other research has argued that megalithic tombs were in locations that would have been ideal for economic exploitation and were therefore representative of megalithic societies' functional relationship with the sea (Clark 1977). However, Karl-Goran Sjögren (2003) has shown through isotope evidence from human remains in the region, that prehistoric inhabitants' diets in the area were largely based on terrestrial foods, not marine resources. Bradley (pers. comm.) has suggested that this again points to the likely relationship of these features' cosmological connection to the shore. It is the relationship between art and cosmology/religion/agency that we are most interested in here. What happens to these relationships when environmental change occurs?

There are two main theories that have been developing. The first is that the sea was fundamentally engrained in the purpose and meaning of maritime rock art, and that rock art sites were both solidifiers and promoters of cosmologies or worldviews, that they served as locations for ritual performance or that they were

sites of social praxis. Therefore sea-level/shoreline changes would have inspired a renegotiation of the relationship between the rock art sites and their intended purpose. This does not prevent rock art from being discussed in terms of symbolic interpretation. It is possible images of Ships represented actual ships, or that they were markers of journeys created during maritime rituals for embarking on or returning from journeys. It is also not a proposition that opposes any of the popular interpretations for rock art that have been presented in this book. In fact it can be an interesting addition to any number of these theories. Rock art theorists agree that the purposes of rock art differed throughout Scandinavia and one can assume that these purposes also changed over the course of rock art's existence. Some sites were re-carved after their initial creation hundreds of years prior, whilst others were created and revisited over generations. Therefore renegotiating the meaning and function of rock art for these societies would not be an unusual action.

This leads to a second, related theory: shoreline displacement may also have had an effect on how prehistoric communities used rock art sites. The theoretical foundation that has just been established by Gell's theory of art and agency applies here. For if rock art could be imbued with agency it can affect other agents, be they humans, other objects or the environment. In the Mesolithic it has been proposed that depositing portable art could have been intended to protect coastal communities from the rising sea. In the Bronze Age perhaps rock art could have been used to prevent the disappearance of the sea from these sacred places.

In fact some of the most interesting studies of rock art and environmental change can be sourced from research on the Mesolithic. Rock art in Scandinavia first appears in the Mesolithic, created along the stretch of habitable land between glacier and sea in northern Norway. In the southern Scandinavian Mesolithic, when more habitable land was exposed, we find less rock art and more portable art. This remains true in Denmark throughout the Bronze Age (see Fig. 1.4), and could perhaps be equated to a lack of suitable rock outcrops or caves for carving and painting. Yet we find carvings on boulders and stones associated with graves in the Stone Age, so it is possible that southern Scandinavian Mesolithic communities *elected* to ornament antler, bone and amber in place of rock (Nimura 2008). The Mesolithic is characterised by fluctuations in sea-level (mainly sea-level rise) caused by the melting of the last Ice Age glacier, which rested on central/northern Norway and Sweden for the first half of the Mesolithic until c. 6550 BC/8500 BP. Multiple transgressions inundated huge swathes of land resulting in the inundation of coastlines and the drowning of Doggerland (the land between Denmark and Britain that now forms the floor of the North Sea).

Lars Larsson's (2003/4) analysis of the Oresund Strait region, which experienced pronounced environmental changes during the Mesolithic, is a pivotal piece. Larsson (2003/4) scrutinises the distribution of rock art, portable art and burial sites in southern Scandinavia and suggests that the worldview of Mesolithic peoples in southern Scandinavia may have been affected as they saw changes (especially in sea-level) occurring in their environment. The placement of graves, rock art and portable art might have been an attempt to prevent rising waters, or to have an effect on the landscape in which they dwelled. Perhaps these features' locations were intentionally chosen as a 'means to try to achieve a balance in a changing world' (Larsson 2003/4, 223). Vincent Vieira (2010) considers the swan

motif at Lake Onega in Karelia and comes to a similar conclusion to Larsson. The rising lake waters inundated certain early sites around Lake Onega and Vieira wonders if this environmental change might have affected the function of the swan motif in the rock carvings of the region. He suggests that in prehistory, 'the motivation for representational practices may have been a cognitive attempt to resolve external challenges within the context of an existing mythological framework' (Vieira 2010, 259). Human response to environmental change is also used to explain other archaeological phenomena. In the Circum-Alpine region, lake dwelling communities deposited the skulls of young children around the lacustrine settlements on the German-Swiss border in the Late Bronze Age. Archaeologists have theorised that the skulls were 'offered' to gods in these secondary burials 'in order to stop the threatening floods' (Menotti, Jennings and Gollnisch-Moos 2014, 457). What each of these scholars proposes is exactly what has been theorised in this book: that the creation of rock art might have been intended to create an effect on the environment itself.

Some scholars have challenged the idea that sea-level changes were an adversity to overcome, as they argue that these changes and their effects are indivisible from the landscape as a whole, which is also indivisible from those who dwell in it. Jim Leary (2009, 228) claims that change in the environment akin to that which Larsson discussed may have been 'an intrinsic part of the Mesolithic world view'. He does not deny that these changes would have affected inhabitants, but argues that these effects may not have been perceived as a one-sided imposition by nature on humans; they would have been integrated into their daily lives. Leary (2011) investigates these ideas further in Northsealand, where he speculates what emotional effects postglacial environmental changes might have had on the local communities. Though we must not assume these changes were one-sided impositions, we must consider that in the Bronze Age communities were used to *acting* on the landscape. By this period widespread practices such as deforestation and erecting large monuments were established actions. Therefore, changes that were beyond their control must have been jarring. And surely if water figured prominently in cosmologies, religious beliefs and worldviews, then shoreline displacement must have begged for a renegotiation of these belief structures.

Larsson (2003/4) proposed that the deposition of portable art and the placement of graves might have been an attempt to 'recreate balance' in the turbulent environment. By the start of the Neolithic the weight of the now-melted glacier had been lifted, and the land itself began to rise in fits of glacio-isostatic rebound. By the Bronze Age the rate of glacio-isostatic movement exceeded that of eustatic rise in many regions. The shorelines that had encroached inland in the Mesolithic began to withdraw. Shoreline displacement characterizes the Bronze Age in certain areas of Scandinavia and it is the effects of this phenomenon that is being contemplated. Though this book has focused largely on cosmologies, shoreline displacement would also have affected rock art even if discussed within a different interpretive framework.

Ling (2008, 9) prefers to discuss 'different social and cognitive aspects of the landscape, related to social and ritual praxis' rather than religious, mythological or cosmological frameworks. Social action/the social act of producing rock art can be directly correlated with maritime activities and environment. We have encountered other authors who believe that rock art sites were places of ritual

activity and it is likely that some of these rituals reflected the rites associated with these very maritime societies (see Kristiansen 2004; Ling and Cornell 2010, 38). Ling and Per Cornell (2010, 39), for example, propose that 'rock art could have served to accentuate and manifest the agency of the maritime social world ...'. These manifestations would have expressed social positions and actions of maritime societies in a region dominated by water and could have played an active role in the landscapes/seascapes of the Bronze Age (Ling and Cornell 2010, 38–40). Ling and Cornell (2010) also use Gell's theories to reinforce the agency of art objects, and see the socio-ritual action of 'magic' as a key to understanding the intention of and action of rock art. They differentiate between magic and religious rituals (which are more akin to McNiven's examples presented in Chapter 2) for it is magic that 'is *intended* to alter and transforms social positions in the landscape, brings about some desired practical result without the interference of supernatural beings (Malinowski 1922, 105; Petrovic 2003, 12–17)' (Ling and Cornell 2010, 33). This secondary agency, an agency which is borne of social intentions, is what they are proposing is a possible praxis of rock art. In Bohuslän where their study is based, this secondary agency is directly connected to the maritime social world.

The maritime social world also includes the water, which could also be argued to be an active part of the environment, an active agent itself. Christina Fredengren (2011) has investigated depositions in water channels in the Mälaren valley, in the region of the site study area Uppland. She proposes that the water could be a material agent, making it an active and fluid part of the human and environment relationship (Fredengren 2011, 126). Fredengren observes changes in depositional patterns of objects when the landscape, specifically watercourses, was affected by shoreline displacement in the Late Bronze Age. She states, 'The shoreline displacement could have been apprehended as if the waters were withdrawing from the network and no longer provided the services that they had enrolled for ... This may have led to a change in how depositional practices have worked in society' (Fredengren 2011, 126). These ideas echo not only Gell, but also recall Ingold's theory of affordances: though water afforded an opportunity for ritual deposition, this could have changed as the water's known paths were altered.

This final chapter evaluated theories that bestow great importance to the effects that the environment and material culture could have on humans. Many theories discussed throughout this book also claimed that prehistoric humans would likely have been conscious of environmental changes. In fact, most of the theories presented argue that due to the intimate and entwined nature of prehistoric humans' relationship to the landscape they would more than 'notice' the changes; the changes would have impacted on them both practically and symbolically. The idea that prehistoric peoples making and using rock art in prehistory would have perceived and responded to environmental change, namely shoreline displacement, is not entirely based on theories from cognitive, landscape or maritime archaeology. It is also based on the rock art sites themselves.

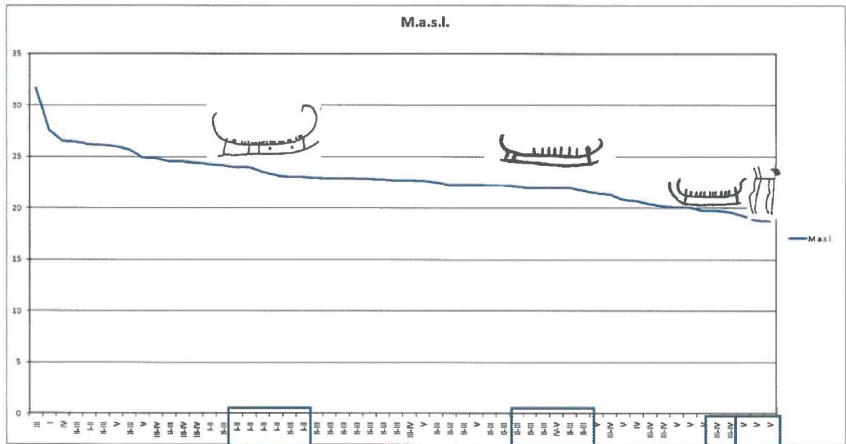


Figure 5.1. 'Typologically determined ship depictions and their altitude. Note, the lowest ships from the EBA I are located close to 25 m.a.s.l., the lowest ships from the EBA II, close to 22 m.a.s.l., the lowest ships depictions from the EBA III, 19–20 m.a.s.l. and the lowest image from the LBA IV–V 18 m.a.s.l.' (Ling 2012, 82: fig. 25).

Once again we can draw on the detailed work of Ling in Uppland. In these areas where shoreline displacement was evident, the carvings at some sites actually chase the disappearing shoreline. In fact, this is a key concept relied on for shoreline dating methodologies. Let us look at two examples from Ling's more recent Uppland study. Ling (2012, 82: fig. 25; Fig. 5.1) compares typological dating methods with the altitudes of rock art Ships in Uppland. He notes that none of the Ships typologically associated with the earliest Early Bronze Age appear below 24 m.a.s.l. In the Bronze Age around 1600–1700 BC, the shoreline would have been about 24–25 m.a.s.l. Therefore the shoreline dating combined with typological dating confirms the date of these Ships. Ling's shoreline reconstructions show that the Ship altitudes decrease through the Bronze Age as the shoreline withdraws. This pattern is clearly seen in various areas around Uppland, such as in the Rickeby and Hemsta areas. In these areas 'the lowest ships from the EBA period I–II ... tend to be close to 22 m.a.s.l., those from period III–IV ... tend to be located at 21–20 m.a.s.l. and the lowest, from period V, tend to be located at about 19–18 m.a.s.l.' (Ling 2012, 30–31: fig. 13). This is also evident in the area surrounding Boglösa 155:1–3, where three panels are located at three different altitudes on a rock outcrop. When the Early Bronze Age images were carved on this rock outcrop it would have been an 'islet or promontory' surrounded by water (Fig 5.2). However when the sea level fell, the Late Bronze Age images were carved onto the lowest panels south of Boglösa 155:1 (Ling 2012, 41–47; 45: fig. 17.4); they were, in effect, chasing the disappearing shoreline. This pattern is repeated throughout Ling's study.

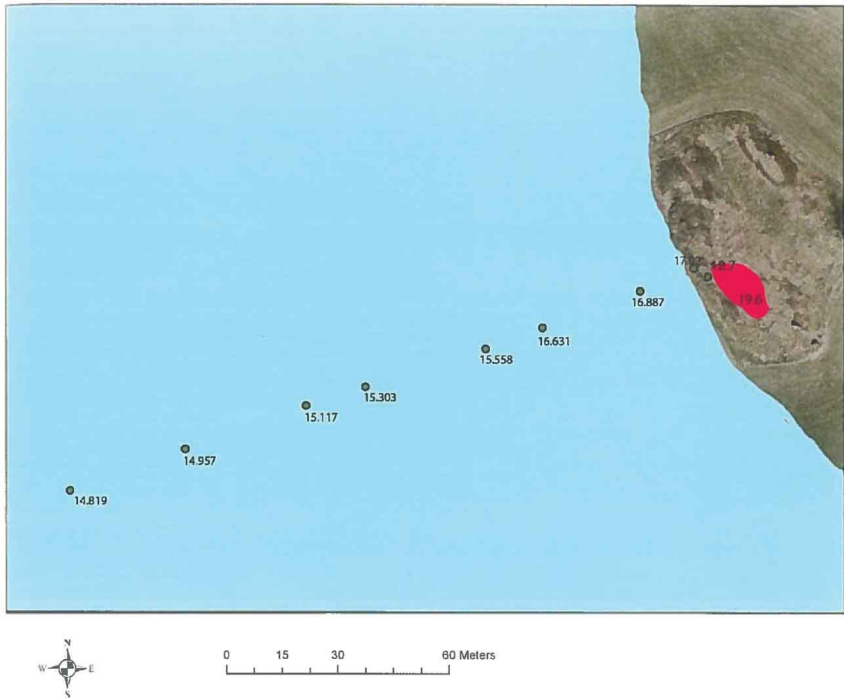


Figure 5.2. 'The altitude and location of the panel Boglösa 155 during the LBA' (Ling 2012, 45: fig. 17.4).

It has already been established that the Ship motif is located close to water in a majority of rock art locations. It has therefore been necessary to look not just at the landscape but also at the marine nature of this landscape, and how that has influenced the meaning and purpose of the rock art within it. The intertwined nature of rock art and the coast is also supported by the data presented in this study. There are three key patterns in Scandinavia that stand out regarding rock art motifs and their proximity to water. The first is that watery environments were specifically chosen for locations to create Ship motifs. 23% of all Ship motifs in Scandinavia are located within 1 km of either the present-day coastline or an inland body of water. This represents the largest number of Ship motifs of any of the distance intervals. The second pattern, which was unknown at the beginning of this study, is that the same is true for other figurative motifs upon which analyses were conducted. 28% of all Circle motifs (including Cup and Ring, Ring, Spiral and Sun Cross/Wheel/Wheel Cross but excluding Oval motifs) are also located within 1 km of the present-day coastline or inland body of water, representing the largest number of Circle motifs in a distance interval. The third pattern to note is that the Foot Sole/Foot motifs are different, and were created further away from water. In Scandinavia, 30% of all Foot Sole/Foot motifs appear *beyond* 25 km and from the present-day coastline or an inland body of water. Across Scandinavia, Ship and Circle motifs show a stronger connection to watery locales than Foot Sole/Foot motifs.

When we compared this pattern to the site study areas the results were

decidedly more complicated. Ship motifs in the site study areas follow the pattern across Scandinavia, though slightly less resolutely. The largest percentage of Ship motifs appear within 1 km of the coastline in Hordaland/Rogaland (90%), Denmark/Skåne (36%) and Trøndelag (28%). The largest percentage of Ship motifs appears within 1–2 km of the coastline in Trøndelag (30%) and Østfold/Bohuslän (17.6%). Uppland (as it has throughout) produces different results: the largest percentage (over half) of Ship motifs appears between 3–4 km of the coastline or inland water. However, as we have seen through the palaeolandscape studies and environmental information, these relative distances could be compared to the Bronze Age landscape showing them to be close to watery environments in prehistory.

Circles in the site study areas also follow the Scandinavian-wide pattern, appearing in close proximity to water. In Uppland, the largest percentage of Circle motifs are actually located closer to water than the Ship motif. This is not the case in Denmark and Skåne however, where the largest percentage of Circle motifs are located further than 25 km and as far as 42 km from the present-day coastline or inland water. The Foot Sole/Foot motifs in the site study areas do not follow their Scandinavian-wide pattern, and in fact behave more similarly to the Ship and Circle motifs. The majority appear within 1 km of water, though in Denmark and Skåne the largest percentage (and the majority) of Foot Sole/Foot motifs appear between 4–5 km. Within the site study areas, these three figurative motifs all show a connection to maritime landscapes.

Resituating rock art in maritime landscapes is now possible due to advances in palaeogeographic, palaeoenvironmental and geological studies in the last couple of decades, and these have compelling implications for the interpretation of this cultural material. As it is now possible to make assertions about the relationship between rock art and the maritime landscape, we are better able to discuss the effects that changes to the shoreline would have had on the rock art in its proximity.

Summary

There are two main theories that this book attempted to establish. The first is that the sea was fundamental to the purpose and meaning of rock art, especially in the Bronze Age, and therefore sea-level/shoreline changes would have inspired a renegotiation of the relationship between the rock art sites and their intended purpose. Many theories have been reviewed and scrutinised, which seek to explain why the sea was important to prehistoric Scandinavian communities. They have ranged from the very practical to the more theoretical, and many involve cosmologies and worldviews that revolve around the sea. It could be argued that the sea was integral to Bronze Age worldviews as this is where prehistoric people opted to create the majority of rock art. Ships generally appear in close proximity to water, and these maritime landscapes were intentionally chosen to house these motifs. But this was not a privilege granted solely to the Ship: it is now clear that Circle, Foot Sole/Foot motifs and other figurative motifs also show a significant relationship to watery locales. Their relationships, however, are not as strong as the Ship and show definite regional variations. On a pan-Scandinavian level the

Foot Sole/Foot motif actually shows the opposite pattern. In those regions where shoreline displacement occurred, the data provide evidence of a strong connection between Ships and water. Published palaeolandscape studies have been used to help interpret the relative distances that were calculated in Chapter 4. This was fruitful especially in regions such as Uppland, which returned distances to water that did not behave as suspected. Yet once georeferenced onto Sund's (2010) Bronze Age maps, they were seen in the maritime landscape in which they were created (see Fig. 4.21–4.24). The importance of the sea is also exemplified by other rock art imagery, as other motifs are related to water. Representations of Ships and Boats are most common, but there are also numerous images of water animals and birds. Representations of Ships also appear in other media, in the form of monumental ship settings and portrayed on portable bronzes, predominantly razors.

In areas where the water itself was under threat, the meaning, purpose and use of rock art, and the cosmologies associated with it, would have also been threatened. It is in these areas where shoreline displacement occurred that one finds the most intense quantity and the most extravagant rock art. Distinct characteristics have been identified in areas where there was visible shoreline displacement, through both published case studies and the data presented in this book. The chronologies tend to be longer, such as in Bohuslän and Trøndelag, where the relationship to water continues into the Early Iron Age. This is not the case in Uppland; here the carvings seem to chase the disappearing shoreline in the Late Bronze Age, but there are few Pre-Roman Iron Age carvings. Were they abandoning the tradition as the water disappeared? There is also the difference in motif quantities. The distribution maps and motif analyses show that the densest concentrations of figurative rock art in Scandinavia are in the Uppland region (3457 figurative motifs), Østfold/Bohuslän region (20,771 figurative motifs) and Trøndelag region (2899 figurative motifs). *These concentrations imply uniqueness in these areas, and they are, interestingly, those areas where there is evidence of shoreline displacement.* Rock art and the sea are intertwined; they are two elements of a cosmological system very focused on elements of the environment. In the areas where this cosmology was threatened by the disappearing sea, we find the most extravagant rock art, and the largest concentrations of rock art.

The fundamental question posed in this book was: would changes to the landscape such as shoreline displacement have affected the purpose and meaning of rock art for the communities that made and used these sites? In order to propose that changes to the landscape affected rock art, this book drew on various theories from within and outside of archaeology, examined studies of environmental change and analysed data derived from the database of Scandinavian rock art. This exploration led to the suggestion of a second theory: that the purpose of rock art might have been altered to have an effect on the disappearing sea. The general theory that rock art would have been affected by environmental change was discussed in tandem with existing interpretations of the meaning and purpose of rock art. It is a general theory that could apply to multiple areas, namely those that experienced changes in the landscape. Imbuing rock art with agency means that it could effect a change and be affected by external changes; rock art with agency is not stagnant but is intertwined in an active web of relations involving maritime landscapes, shoreline displacement and communities. And though they

were created in stone, fixed in time and place, rock art would have propagated belief systems that would have changed over time as they were re-carved, abandoned and used by different groups of inhabitants. Whatever changes occurred to belief systems in the thousands of years rock art was created, it is likely that shoreline displacement would have inspired a renegotiation of the purpose and meaning of this rock art situated alongside the Scandinavian seas.

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